Sub A1

SEQUENCE LISTING

<110> Dattwyler, Raymond J.
Seinost, Gerald
Dykhuizen, Danial
Luft, Benjamin J.
Maria J.C. Gomes-Solecki

<120> Groups of Borrelia burgdorferi and
Borrelia afzelii That Cause Lyme Disease in Humans

<130> 2631.1002-001

<150> US 60/140,042
<151> 1999-06-18

<160> 84

<170> FastSEQ for Windows Version 4.0

<210> 1
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 1
aaagaataca ttaagtgcga tatt 24

<210> 2
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 2
caatccactt aatttttgtg ttattag 27

<210> 3
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 3
ttgttagcag gagcttatgc aatatc 26

<210> 4
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 4
gggcttgtaa gctctttaac tg 22

<210> 5
<211> 573
<212> DNA
<213> borrelia burgdorferi

<220>
<221> CDS
<222> (1)...(573)

<400> 5
atg gct tgt aat aat tca ggg aaa gat ggg aat aca tct gca aat tct 48
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
1 5 10 15

gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa aaa 96
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
20 25 30

att acg gat tct aat gcg gtt tta ctt gct gtg aaa gag gtt gaa gcg 144
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
35 40 45

ttg ctg tca tct ata gat gag ctt gct aaa gct att ggt aaa aaa ata 192
Leu Leu Ser Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys Lys Ile
50 55 60

aaa aac gat ggt agt tta gat aat gaa gca aat cgc aac gag tca ttg 240
Lys Asn Asp Gly Ser Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser Leu
65 70 75 80

tta gca gga gct tat aca ata tca acc tta ata aca caa aaa tta agt 288
Leu Ala Gly Ala Tyr Thr Ile Ser Thr Leu Ile Thr Gln Lys Leu Ser
85 90 95

aaa tta aac gga tca gaa ggt tta aag gaa aag att gcc gca gct aag 336
Lys Leu Asn Gly Ser Glu Gly Leu Lys Glu Lys Ile Ala Ala Ala Lys
100 105 110

aaa tgc tct gaa gag ttt agt act aaa cta aaa gat aat cat gca cag 384
Lys Cys Ser Glu Glu Phe Ser Thr Lys Leu Lys Asp Asn His Ala Gln
115 120 125

ctt ggt ata cag ggc gtt act gat gaa aat gca aaa aaa gct att tta 432
Leu Gly Ile Gln Gly Val Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu
130 135 140

aaa gca aat gca gcg ggt aaa gat aag ggc gtt gaa gaa ctt gaa aag 480
Lys Ala Asn Ala Ala Gly Lys Asp Lys Gly Val Glu Glu Leu Glu Lys
145 150 155 160

ttg tcc gga tca tta gaa agc tta tca aaa gca gct aaa gag atg ctt 528
Leu Ser Gly Ser Leu Glu Ser Leu Ser Lys Ala Ala Lys Glu Met Leu
165 170 175

Sub A1

Sub A1

```
ttg tcc gga tca tta gaa agc tta tca aaa gca gct aaa gag atg ctt   528
Leu Ser Gly Ser Leu Glu Ser Leu Ser Lys Ala Ala Lys Glu Met Leu
                165                 170                 175

gct aat tca gtt aaa gag ctt aca agc cct gtt gtc cat gga tcc       573
Ala Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val His Gly Ser
            180                 185                 190
```

<210> 6
<211> 190
<212> PRT
<213> borrelia burgdorferi

<400> 6

```
Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala
 1               5                  10                  15
Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile
            20                  25                  30
Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala Leu
        35                  40                  45
Leu Ser Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys Lys Ile Lys
    50                  55                  60
Asn Asp Gly Ser Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser Leu Leu
65                  70                  75                  80
Ala Gly Ala Tyr Thr Ile Ser Thr Leu Ile Thr Gln Lys Leu Ser Lys
                85                  90                  95
Leu Asn Gly Ser Glu Gly Leu Lys Glu Lys Ile Ala Ala Ala Lys Lys
            100                 105                 110
Cys Ser Glu Glu Phe Ser Thr Lys Leu Lys Asp Asn His Ala Gln Leu
        115                 120                 125
Gly Ile Gln Gly Val Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu Lys
    130                 135                 140
Ala Asn Ala Ala Gly Lys Asp Lys Gly Val Glu Glu Leu Glu Lys Leu
145                 150                 155                 160
Ser Gly Ser Leu Glu Ser Leu Ser Lys Ala Ala Lys Glu Met Leu Ala
                165                 170                 175
Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val His Gly Ser
            180                 185                 190
```

<210> 7
<211> 557
<212> DNA
<213> Borrelia burgdorferi

<220>
<221> CDS
<222> (1)...(557)

<400> 7

```
atg gct tgt aat aat tca gga aaa gat ggg aat gca tct gca aat tct    48
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Ala Ser Ala Asn Ser
 1               5                  10                  15

gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa aaa    96
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
            20                  25                  30
```

SubA1

```
att aca gaa tct aac gca gtt gtt ctg gcc gtg aaa gaa gtt gag acc   144
Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val Glu Thr
        35                  40                  45

tta ctt gca tct ata gat gaa ctt gct acc aaa gct att ggt aaa aaa   192
Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys
    50                  55                  60

ata ggc aat aat ggt tta gag gcc aat cag agt aaa aac aca tca ttg   240
Ile Gly Asn Asn Gly Leu Glu Ala Asn Gln Ser Lys Asn Thr Ser Leu
65                  70                  75                  80

tta tca gga gct tat gca ata tct gac cta ata gca gaa aaa tta aat   288
Leu Ser Gly Ala Tyr Ala Ile Ser Asp Leu Ile Ala Glu Lys Leu Asn
                85                  90                  95

gta ttg aaa aat gaa gaa tta aag gaa aag att gat aca gct aag caa   336
Val Leu Lys Asn Glu Glu Leu Lys Glu Lys Ile Asp Thr Ala Lys Gln
            100                 105                 110

tgt tct aca gaa ttt act aat aaa cta aaa agt gaa cat gca gtg ctt   384
Cys Ser Thr Glu Phe Thr Asn Lys Leu Lys Ser Glu His Ala Val Leu
        115                 120                 125

ggt ctg gac aat ctt act gat gat aat gca caa aga gct att tta aaa   432
Gly Leu Asp Asn Leu Thr Asp Asp Asn Ala Gln Arg Ala Ile Leu Lys
    130                 135                 140

aaa cat gca aat aaa gat aag ggt gct gca gaa ctt gaa aag tta ttt   480
Lys His Ala Asn Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe
145                 150                 155                 160

aaa gcg gta gaa aac tta tca aaa gca gct caa gac aca tta aaa aat   528
Lys Ala Val Glu Asn Leu Ser Lys Ala Ala Gln Asp Thr Leu Lys Asn
                165                 170                 175

gct gtt aaa gag ctt aca agt cct att gt                           557
Ala Val Lys Glu Leu Thr Ser Pro Ile
            180                 185
```

<210> 8
<211> 184
<212> PRT
<213> Borrelia burgdorferi

<400> 8

```
Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Ala Ser Ala Asn Ser Ala
 1               5                  10                  15
Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile
            20                  25                  30
Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val Glu Thr Leu
        35                  40                  45
Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys Ile
    50                  55                  60
Gly Asn Asn Gly Leu Glu Ala Asn Gln Ser Lys Asn Thr Ser Leu Leu
65                  70                  75                  80
Ser Gly Ala Tyr Ala Ile Ser Asp Leu Ile Ala Glu Lys Leu Asn Val
                85                  90                  95
```

Sub A'

```
Leu Lys Asn Glu Glu Leu Lys Glu Lys Ile Asp Thr Ala Lys Gln Cys
            100                 105                 110
Ser Thr Glu Phe Thr Asn Lys Leu Lys Ser Glu His Ala Val Leu Gly
        115                 120                 125
Leu Asp Asn Leu Thr Asp Asp Asn Ala Gln Arg Ala Ile Leu Lys Lys
    130                 135                 140
His Ala Asn Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe Lys
145                 150                 155                 160
Ala Val Glu Asn Leu Ser Lys Ala Ala Gln Asp Thr Leu Lys Asn Ala
                165                 170                 175
Val Lys Glu Leu Thr Ser Pro Ile
            180
```

<210> 9
<211> 579
<212> DNA
<213> Borrelia burgdorferi

<220>
<221> CDS
<222> (1)...(579)

```
<400> 9
atg act tta ttt tta ttt ata tct tgt aat aat tca ggg aaa gat ggg   48
Met Thr Leu Phe Leu Phe Ile Ser Cys Asn Asn Ser Gly Lys Asp Gly
 1               5                  10                  15

aat aca tct gca aat tct gct gat gag tct gtt aaa ggg cct aat ctt   96
Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu
            20                  25                  30

aca gaa ata agt aaa aaa att acg gat tct aat gcg gtt tta ctt gct  144
Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu Leu Ala
        35                  40                  45

gtg aaa gag gtt gaa gcg ttg ctg tca tct ata gat gaa att gct gct  192
Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Ile Ala Ala
    50                  55                  60

aaa gct att ggt aaa aaa ata cac caa aat aat ggt ttg gat acc gaa  240
Lys Ala Ile Gly Lys Lys Ile His Gln Asn Asn Gly Leu Asp Thr Glu
65                  70                  75                  80

aat aat cac aat gga tca ttg tta gcg gga gct tat gca ata tca acc  288
Asn Asn His Asn Gly Ser Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr
                85                  90                  95

cta ata aaa caa aaa tta gat gga ttg aaa aat gaa gga tta aag gaa  336
Leu Ile Lys Gln Lys Leu Asp Gly Leu Lys Asn Glu Gly Leu Lys Glu
            100                 105                 110

aaa att gat gcg gct aag aaa tgt tct gaa aca ttt act aat aaa tta  384
Lys Ile Asp Ala Ala Lys Lys Cys Ser Glu Thr Phe Thr Asn Lys Leu
        115                 120                 125

aaa gaa aaa cac aca gat ctt ggt aaa gaa ggt gtt act gat gct gat  432
Lys Glu Lys His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp Ala Asp
    130                 135                 140
```

Sub A1

```
gca aaa gaa gcc att tta aaa aca aat ggt act aaa act aaa ggt gct   480
Ala Lys Glu Ala Ile Leu Lys Thr Asn Gly Thr Lys Thr Lys Gly Ala
145                 150                 155                 160

gaa gaa ctt gga aaa tta ttt gaa tca gta gag gtc ttg tca aaa gca   528
Glu Glu Leu Gly Lys Leu Phe Glu Ser Val Glu Val Leu Ser Lys Ala
                165                 170                 175

gct aaa gag atg ctt gct aat tca gtt aaa gag ctt aca agc cct gtt   576
Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser Pro Val
            180                 185                 190

                                                                 579
gtg
Val
```

<210> 10
<211> 192
<212> PRT
<213> Borrelia burgdorferi

<400> 10

```
Thr Leu Phe Leu Phe Ile Ser Cys Asn Asn Ser Gly Lys Asp Gly Asn
 1               5                  10                  15
Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr
            20                  25                  30
Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val
        35                  40                  45
Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys
    50                  55                  60
Ala Ile Gly Lys Lys Ile His Gln Asn Asn Gly Leu Asp Thr Glu Asn
65                  70                  75                  80
Asn His Asn Gly Ser Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu
                85                  90                  95
Ile Lys Gln Lys Leu Asp Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys
            100                 105                 110
Ile Asp Ala Ala Lys Lys Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys
        115                 120                 125
Glu Lys His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp Ala Asp Ala
    130                 135                 140
Lys Glu Ala Ile Leu Lys Thr Asn Gly Thr Lys Thr Lys Gly Ala Glu
145                 150                 155                 160
Glu Leu Gly Lys Leu Phe Glu Ser Val Glu Val Leu Ser Lys Ala Ala
                165                 170                 175
Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val
            180                 185                 190
```

<210> 11
<211> 582
<212> DNA
<213> Borrelia brgdorferi

<220>
<221> CDS
<222> (1)...(582)

<400> 11

```
atg act tta ttt tta ttt ata tct tgt aat aat tca ggg aaa gat ggg   48
Met Thr Leu Phe Leu Phe Ile Ser Cys Asn Asn Ser Gly Lys Asp Gly
 1               5                  10                  15

aat aca tct gca aat tct gct gat gag tct gtt aaa ggg cct aat ctt   96
Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu
            20                  25                  30

aca gaa ata agt aaa aaa att acg gat tct aat gcg gtt tta ctt gct  144
Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu Leu Ala
        35                  40                  45

gtg aaa gag gtt gaa gcg ttg ctg tca tct ata gat gag ctt gct aaa  192
Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Leu Ala Lys
    50                  55                  60

gct att ggt aaa aaa ata aaa aac gat ggt agt tta gat aat gaa gca  240
Ala Ile Gly Lys Lys Ile Lys Asn Asp Gly Ser Leu Asp Asn Glu Ala
65                  70                  75                  80

aat cgc aac gag tca ttg tta gca gga gct tat aca ata tca acc tta  288
Asn Arg Asn Glu Ser Leu Leu Ala Gly Ala Tyr Thr Ile Ser Thr Leu
                85                  90                  95

ata aca caa aaa tta agt aaa tta aac gga tca gaa ggt tta aag gaa  336
Ile Thr Gln Lys Leu Ser Lys Leu Asn Gly Ser Glu Gly Leu Lys Glu
            100                 105                 110

aag att gcc gca gct aag aaa tgc tct gaa gag ttt agt act aaa cta  384
Lys Ile Ala Ala Ala Lys Lys Cys Ser Glu Glu Phe Ser Thr Lys Leu
        115                 120                 125

aaa gat aat cat gca cag ctt ggt ata cag ggc gtt act gat gaa aat  432
Lys Asp Asn His Ala Gln Leu Gly Ile Gln Gly Val Thr Asp Glu Asn
    130                 135                 140

gca aaa aaa gct att tta aaa gca aat gca gcg ggt aaa gat aag ggc  480
Ala Lys Lys Ala Ile Leu Lys Ala Asn Ala Ala Gly Lys Asp Lys Gly
145                 150                 155                 160

gtt gaa gaa ctt gaa aag ttg tcc gga tca tta gaa agc tta tca aaa  528
Val Glu Glu Leu Glu Lys Leu Ser Gly Ser Leu Glu Ser Leu Ser Lys
                165                 170                 175

gca gct aaa gag atg ctt gct aat tca gtt aaa gag ctt aca agc cct  576
Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser Pro
            180                 185                 190

                                                                582
gtt gtg
Val Val
```

<210> 12
<211> 193
<212> PRT
<213> Borrelia brgdorferi

<400> 12
Thr Leu Phe Leu Phe Ile Ser Cys Asn Asn Ser Gly Lys Asp Gly Asn
1 5 10 15
Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr
20 25 30
Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val
35 40 45
Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Leu Ala Lys Ala
50 55 60
Ile Gly Lys Lys Ile Lys Asn Asp Gly Ser Leu Asp Asn Glu Ala Asn
65 70 75 80
Arg Asn Glu Ser Leu Leu Ala Gly Ala Tyr Thr Ile Ser Thr Leu Ile
85 90 95
Thr Gln Lys Leu Ser Lys Leu Asn Gly Ser Glu Gly Leu Lys Glu Lys
100 105 110
Ile Ala Ala Ala Lys Lys Cys Ser Glu Glu Phe Ser Thr Lys Leu Lys
115 120 125
Asp Asn His Ala Gln Leu Gly Ile Gln Gly Val Thr Asp Glu Asn Ala
130 135 140
Lys Lys Ala Ile Leu Lys Ala Asn Ala Ala Gly Lys Asp Lys Gly Val
145 150 155 160
Glu Glu Leu Glu Lys Leu Ser Gly Ser Leu Glu Ser Leu Ser Lys Ala
165 170 175
Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser Pro Val
180 185 190
Val

<210> 13
<211> 576
<212> DNA
<213> Borrelia burgdorferi

<220>
<221> CDS
<222> (1)...(576)

<400> 13
atg act tta ttt tta ttt ata tct tgt aat aat tca gga aaa gat ggg 48
Met Thr Leu Phe Leu Phe Ile Ser Cys Asn Asn Ser Gly Lys Asp Gly
1 5 10 15

aat gca tct gca aat tct gct gat gag tct gtt aaa ggg cct aat ctt 96
Asn Ala Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu
20 25 30

aca gaa ata agt aaa aaa att aca gaa tct aac gca gtt gtt ctg gcc 144
Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala
35 40 45

gtg aaa gaa gtt gag acc tta ctt gca tct ata gat gaa ctt gct acc 192
Val Lys Glu Val Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr
50 55 60

aaa gct att ggt aaa aaa ata ggc aat aat ggt tta gag gcc aat cag 240
Lys Ala Ile Gly Lys Lys Ile Gly Asn Asn Gly Leu Glu Ala Asn Gln
65 70 75 80

```
agt aaa aac aca tca ttg tta tca gga gct tat gca ata tct gac cta   288
Ser Lys Asn Thr Ser Leu Leu Ser Gly Ala Tyr Ala Ile Ser Asp Leu
                85                  90                  95

ata gca gaa aaa tta aat gta ttg aaa aat gaa gaa tta aag gaa aag   336
Ile Ala Glu Lys Leu Asn Val Leu Lys Asn Glu Glu Leu Lys Glu Lys
            100                 105                 110

att gat aca gct aag caa tgt tct aca gaa ttt act aat aaa cta aaa   384
Ile Asp Thr Ala Lys Gln Cys Ser Thr Glu Phe Thr Asn Lys Leu Lys
        115                 120                 125

agt gaa cat gca gtg ctt ggt ctg gac aat ctt act gat gat aat gca   432
Ser Glu His Ala Val Leu Gly Leu Asp Asn Leu Thr Asp Asp Asn Ala
    130                 135                 140

caa aga gct att tta aaa aaa cat gca aat aaa gat aag ggt gct gca   480
Gln Arg Ala Ile Leu Lys Lys His Ala Asn Lys Asp Lys Gly Ala Ala
145                 150                 155                 160

gaa ctt gaa aag tta ttt aaa gcg gta gaa aac tta tca aaa gca gct   528
Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ser Lys Ala Ala
                165                 170                 175

caa gac aca tta aaa aat gct gtt aaa gag ctt aca agt cct att gtg   576
Gln Asp Thr Leu Lys Asn Ala Val Lys Glu Leu Thr Ser Pro Ile Val
            180                 185                 190
```

<210> 14
<211> 191
<212> PRT
<213> Borrelia burgdorferi

<400> 14

```
Thr Leu Phe Leu Phe Ile Ser Cys Asn Asn Ser Gly Lys Asp Gly Asn
 1               5                  10                  15
Ala Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr
            20                  25                  30
Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val
        35                  40                  45
Lys Glu Val Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys
    50                  55                  60
Ala Ile Gly Lys Lys Ile Gly Asn Asn Gly Leu Glu Ala Asn Gln Ser
65                  70                  75                  80
Lys Asn Thr Ser Leu Leu Ser Gly Ala Tyr Ala Ile Ser Asp Leu Ile
                85                  90                  95
Ala Glu Lys Leu Asn Val Leu Lys Asn Glu Glu Leu Lys Glu Lys Ile
            100                 105                 110
Asp Thr Ala Lys Gln Cys Ser Thr Glu Phe Thr Asn Lys Leu Lys Ser
        115                 120                 125
Glu His Ala Val Leu Gly Leu Asp Asn Leu Thr Asp Asp Asn Ala Gln
    130                 135                 140
Arg Ala Ile Leu Lys Lys His Ala Asn Lys Asp Lys Gly Ala Ala Glu
145                 150                 155                 160
Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ser Lys Ala Ala Gln
                165                 170                 175
```

Sub A1

```
Asp Thr Leu Lys Asn Ala Val Lys Glu Leu Thr Ser Pro Ile Val
        180                 185                 190


<210> 15
<211> 576
<212> DNA
<213> borrelia burgdorferi

<220>
<221> CDS
<222> (1)...(576)

<400> 15
atg act tta ttt tta ttt ata tct tgt aat aat tca aga aaa gat ggg   48
Met Thr Leu Phe Leu Phe Ile Ser Cys Asn Asn Ser Arg Lys Asp Gly
 1               5                  10                  15

aat gca tct aca aat tct gcc gat gag tct gtt aaa ggg cct aat ctt   96
Asn Ala Ser Thr Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu
            20                  25                  30

aca gaa ata agt aaa aaa att aca gaa tct aac gca gtt gtt ctg gcc   144
Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala
        35                  40                  45

gtg aaa gaa gtt gag acc tta ctt gca tct ata gat gaa ctt gct acc   192
Val Lys Glu Val Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr
    50                  55                  60

aaa gct att ggt aag aaa ata ggc aat aat ggt tta gag gcc aat cag   240
Lys Ala Ile Gly Lys Lys Ile Gly Asn Asn Gly Leu Glu Ala Asn Gln
65                  70                  75                  80

agt aaa aac aca tca ttg tta tca gga gct tat gca ata tct gac cta   288
Ser Lys Asn Thr Ser Leu Leu Ser Gly Ala Tyr Ala Ile Ser Asp Leu
                85                  90                  95

ata gca gaa aaa tta aat gta ttg aaa aat gaa gaa tta aag gaa aag   336
Ile Ala Glu Lys Leu Asn Val Leu Lys Asn Glu Glu Leu Lys Glu Lys
            100                 105                 110

att gat aca gct aag caa tgt tct aca gaa ttt act aat aaa cta aaa   384
Ile Asp Thr Ala Lys Gln Cys Ser Thr Glu Phe Thr Asn Lys Leu Lys
        115                 120                 125

agt gaa cat gca gtg ctt ggt ctg gac aat ctt act gat gat aat gca   432
Ser Glu His Ala Val Leu Gly Leu Asp Asn Leu Thr Asp Asp Asn Ala
    130                 135                 140

caa aga gct att tta aaa aaa cat gca aat aaa gat aag ggt gct gca   480
Gln Arg Ala Ile Leu Lys Lys His Ala Asn Lys Asp Lys Gly Ala Ala
145                 150                 155                 160

gaa ctt gaa aag tta ttt aaa gcg gta gaa aac tta tca aaa gca gct   528
Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ser Lys Ala Ala
                165                 170                 175
```

Sub A1

```
caa gac aca tta aaa aat gct gtt aaa gag ctt aca agt cct att gtg   576
Gln Asp Thr Leu Lys Asn Ala Val Lys Glu Leu Thr Ser Pro Ile Val
        180                 185                 190
```

<210> 16
<211> 191
<212> PRT
<213> borrelia burgdorferi

<400> 16

```
Thr Leu Phe Leu Phe Ile Ser Cys Asn Asn Ser Arg Lys Asp Gly Asn
 1               5                  10                  15
Ala Ser Thr Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr
            20                  25                  30
Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val
        35                  40                  45
Lys Glu Val Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys
    50                  55                  60
Ala Ile Gly Lys Lys Ile Gly Asn Asn Gly Leu Glu Ala Asn Gln Ser
65                  70                  75                  80
Lys Asn Thr Ser Leu Leu Ser Gly Ala Tyr Ala Ile Ser Asp Leu Ile
                85                  90                  95
Ala Glu Lys Leu Asn Val Leu Lys Asn Glu Glu Leu Lys Glu Lys Ile
            100                 105                 110
Asp Thr Ala Lys Gln Cys Ser Thr Glu Phe Thr Asn Lys Leu Lys Ser
        115                 120                 125
Glu His Ala Val Leu Gly Leu Asp Asn Leu Thr Asp Asp Asn Ala Gln
    130                 135                 140
Arg Ala Ile Leu Lys Lys His Ala Asn Lys Asp Lys Gly Ala Ala Glu
145                 150                 155                 160
Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ser Lys Ala Ala Gln
                165                 170                 175
Asp Thr Leu Lys Asn Ala Val Lys Glu Leu Thr Ser Pro Ile Val
            180                 185                 190
```

<210> 17
<211> 573
<212> DNA
<213> Borrelia burgdorferi

<220>
<221> CDS
<222> (1)...(573)

<400> 17

```
atg act tta ttt tta ttt ata tct tgt aat aat tca ggg aaa gat ggg   48
Met Thr Leu Phe Leu Phe Ile Ser Cys Asn Asn Ser Gly Lys Asp Gly
 1               5                  10                  15

aat aca tct gca aat tct gct gat gag tct gtt aaa ggg cct aat ctt   96
Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu
            20                  25                  30

aca gaa ata agt aaa aaa att aca gaa tct aac gca gtt gtt ctc gcc   144
Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala
        35                  40                  45
```

Sub A1

```
gtg aaa gaa gtt gaa act ttg ctt aca tct ata gat gag ctt gct aaa   192
Val Lys Glu Val Glu Thr Leu Leu Thr Ser Ile Asp Glu Leu Ala Lys
     50                  55                  60

gct att ggt aaa aaa ata aaa aac gat gtt agt tta gat aat gag gca   240
Ala Ile Gly Lys Lys Ile Lys Asn Asp Val Ser Leu Asp Asn Glu Ala
 65                  70                  75                  80

gat cac aac gga tca tta ata tca gga gca tat tta att tca aac tta   288
Asp His Asn Gly Ser Leu Ile Ser Gly Ala Tyr Leu Ile Ser Asn Leu
                85                  90                  95

ata aca aaa aaa ata agt gca ata aaa gat tca gga gaa ttg aag gca   336
Ile Thr Lys Lys Ile Ser Ala Ile Lys Asp Ser Gly Glu Leu Lys Ala
            100                 105                 110

gaa att gaa aag gct aag aaa tgt tct gaa gaa ttt act gct aaa tta   384
Glu Ile Glu Lys Ala Lys Lys Cys Ser Glu Glu Phe Thr Ala Lys Leu
        115                 120                 125

aaa ggt gaa cac aca gat ctt ggt aaa gaa ggc gtt act gat gat aat   432
Lys Gly Glu His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp Asp Asn
    130                 135                 140

gca aaa aaa gcc att tta aaa aca aat aat gat aaa act aag ggc gct   480
Ala Lys Lys Ala Ile Leu Lys Thr Asn Asn Asp Lys Thr Lys Gly Ala
145                 150                 155                 160

gat gaa ctt gaa aag tta ttt gaa tca gta aaa aac ttg tca aaa gca   528
Asp Glu Leu Glu Lys Leu Phe Glu Ser Val Lys Asn Leu Ser Lys Ala
                165                 170                 175

gct aaa gag atg ctt act aat tca gtt aaa gag ctt aca agc cct       573
Ala Lys Glu Met Leu Thr Asn Ser Val Lys Glu Leu Thr Ser Pro
            180                 185                 190
```

<210> 18
<211> 190
<212> PRT
<213> Borrelia burgdorferi

<400> 18

```
Thr Leu Phe Leu Phe Ile Ser Cys Asn Asn Ser Gly Lys Asp Gly Asn
 1               5                  10                  15
Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr
            20                  25                  30
Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val
        35                  40                  45
Lys Glu Val Glu Thr Leu Leu Thr Ser Ile Asp Glu Leu Ala Lys Ala
    50                  55                  60
Ile Gly Lys Lys Ile Lys Asn Asp Val Ser Leu Asp Asn Glu Ala Asp
65                  70                  75                  80
His Asn Gly Ser Leu Ile Ser Gly Ala Tyr Leu Ile Ser Asn Leu Ile
                85                  90                  95
Thr Lys Lys Ile Ser Ala Ile Lys Asp Ser Gly Glu Leu Lys Ala Glu
            100                 105                 110
```

```
Ile Glu Lys Ala Lys Lys Cys Ser Glu Glu Phe Thr Ala Lys Leu Lys
        115                 120                 125
Gly Glu His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp Asp Asn Ala
    130                 135                 140
Lys Lys Ala Ile Leu Lys Thr Asn Asn Asp Lys Thr Lys Gly Ala Asp
145                 150                 155                 160
Glu Leu Glu Lys Leu Phe Glu Ser Val Lys Asn Leu Ser Lys Ala Ala
                165                 170                 175
Lys Glu Met Leu Thr Asn Ser Val Lys Glu Leu Thr Ser Pro
            180                 185                 190
```

<210> 19
<211> 553
<212> DNA
<213> Borrelia burgdorferi

<220>
<221> CDS
<222> (1)...(553)

<400> 19

```
atg act tta ttt tta ttt ata tct tgt aat aat tca gga aaa gat ggg   48
Met Thr Leu Phe Leu Phe Ile Ser Cys Asn Asn Ser Gly Lys Asp Gly
 1               5                  10                  15

aat aca tct gca aat tct gct gat gag tct gtt aaa ggg cct aat ctt   96
Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu
            20                  25                  30

aca gaa ata agt aaa aaa att aca gaa tct aac gca gtt gtt ctg gct   144
Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala
        35                  40                  45

gtg aaa gaa att gaa act ttg ctt gca tct ata gat gaa ctt gct act   192
Val Lys Glu Ile Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr
    50                  55                  60

aaa gct att ggt aaa aaa ata gat aac aat gct ggt ttg ggt gct gaa   240
Lys Ala Ile Gly Lys Lys Ile Asp Asn Asn Ala Gly Leu Gly Ala Glu
65                  70                  75                  80

gtg ggt caa aac gga tca ttg cta gca gga gct tat gca atc tca act   288
Val Gly Gln Asn Gly Ser Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr
                85                  90                  95

gta ata ata gaa aaa ttg agc aca tta aaa aat gta gaa gaa tta aaa   336
Val Ile Ile Glu Lys Leu Ser Thr Leu Lys Asn Val Glu Glu Leu Lys
            100                 105                 110

gaa aaa att aca aag gct aag gat tgt tct gaa aaa ttc act aaa aaa   384
Glu Lys Ile Thr Lys Ala Lys Asp Cys Ser Glu Lys Phe Thr Lys Lys
        115                 120                 125

tta aaa gat agc cgc gca gag ctt ggt aaa aaa gat gcc agt gat gat   432
Leu Lys Asp Ser Arg Ala Glu Leu Gly Lys Lys Asp Ala Ser Asp Asp
    130                 135                 140
```

```
gat gca aaa aaa gct att tta aaa aca aat caa gct aac gat aag ggt   480
Asp Ala Lys Lys Ala Ile Leu Lys Thr Asn Gln Ala Asn Asp Lys Gly
145                 150                 155                 160

gct aaa gaa ctt aaa gag tta ttt gaa gca gta gaa agc ttg tca aaa   528
Ala Lys Glu Leu Lys Glu Leu Phe Glu Ala Val Glu Ser Leu Ser Lys
                165                 170                 175

gcg gct aaa gag atg cta aac aag t                                553
Ala Ala Lys Glu Met Leu Asn Lys
            180
```

<210> 20
<211> 183
<212> PRT
<213> Borrelia burgdorferi

<400> 20

```
Thr Leu Phe Leu Phe Ile Ser Cys Asn Asn Ser Gly Lys Asp Gly Asn
 1               5                  10                  15
Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr
            20                  25                  30
Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val
        35                  40                  45
Lys Glu Ile Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys
    50                  55                  60
Ala Ile Gly Lys Lys Ile Asp Asn Asn Ala Gly Leu Gly Ala Glu Val
65                  70                  75                  80
Gly Gln Asn Gly Ser Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Val
                85                  90                  95
Ile Ile Glu Lys Leu Ser Thr Leu Lys Asn Val Glu Glu Leu Lys Glu
            100                 105                 110
Lys Ile Thr Lys Ala Lys Asp Cys Ser Glu Lys Phe Thr Lys Lys Leu
        115                 120                 125
Lys Asp Ser Arg Ala Glu Leu Gly Lys Lys Asp Ala Ser Asp Asp Asp
    130                 135                 140
Ala Lys Lys Ala Ile Leu Lys Thr Asn Gln Ala Asn Asp Lys Gly Ala
145                 150                 155                 160
Lys Glu Leu Lys Glu Leu Phe Glu Ala Val Glu Ser Leu Ser Lys Ala
                165                 170                 175
Ala Lys Glu Met Leu Asn Lys
            180
```

<210> 21
<211> 582
<212> DNA
<213> Borrelia burgdorferi

<220>
<221> CDS
<222> (1)...(582)

<400> 21

```
atg act tta ttt tta ttt ata tct tgt aat aat tca gga aaa gat ggg   48
Met Thr Leu Phe Leu Phe Ile Ser Cys Asn Asn Ser Gly Lys Asp Gly
 1               5                  10                  15
```

```
aat aca tct gca aat tct gct gat gag tct gtt aaa ggg cct aat ctt   96
Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu
            20                  25                  30

aca gaa ata agt aaa aaa att aca gaa tct aac gca gtt gtt ctg gct  144
Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala
        35                  40                  45

gtg aaa gaa att gaa act ttg ctt gca tct ata gat gaa ctt gct act  192
Val Lys Glu Ile Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr
    50                  55                  60

aaa gct att ggt aaa aaa ata caa caa aat ggt ggt tta gct gtc gaa  240
Lys Ala Ile Gly Lys Lys Ile Gln Gln Asn Gly Gly Leu Ala Val Glu
65                  70                  75                  80

gcg ggg cat aat gga aca ttg tta gca ggt gct tat aca ata tca aaa  288
Ala Gly His Asn Gly Thr Leu Leu Ala Gly Ala Tyr Thr Ile Ser Lys
                85                  90                  95

cta ata aca caa aaa tta gat gga ttg aaa aat tca gaa aaa tta aag  336
Leu Ile Thr Gln Lys Leu Asp Gly Leu Lys Asn Ser Glu Lys Leu Lys
            100                 105                 110

gaa aaa att gaa aat gct aag aaa tgt tct gaa gat ttt act aaa aaa  384
Glu Lys Ile Glu Asn Ala Lys Lys Cys Ser Glu Asp Phe Thr Lys Lys
        115                 120                 125

cta gaa gga gaa cat gcg caa ctt gga att gaa aat gtt act gat gag  432
Leu Glu Gly Glu His Ala Gln Leu Gly Ile Glu Asn Val Thr Asp Glu
    130                 135                 140

aat gca aaa aaa gct att tta ata aca gat gca gct aaa gat aag ggc  480
Asn Ala Lys Lys Ala Ile Leu Ile Thr Asp Ala Ala Lys Asp Lys Gly
145                 150                 155                 160

gct gca gag ctt gaa aag cta ttt aaa gca gta gaa aac ttg gca aaa  528
Ala Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ala Lys
                165                 170                 175

gca gct aaa gag atg ctt gct aat tca gtt aaa gag ctt aca agt cct  576
Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser Pro
            180                 185                 190

att gtg                                                         582
Ile Val
```

<210> 22
<211> 193
<212> PRT
<213> Borrelia burgdorferi

<400> 22

```
Thr Leu Phe Leu Phe Ile Ser Cys Asn Asn Ser Gly Lys Asp Gly Asn
 1               5                  10                  15
Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr
            20                  25                  30
```

Sub A1

```
Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val
        35                  40                  45
Lys Glu Ile Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys
    50                  55                  60
Ala Ile Gly Lys Lys Ile Gln Gln Asn Gly Gly Leu Ala Val Glu Ala
65                  70                  75                  80
Gly His Asn Gly Thr Leu Leu Ala Gly Ala Tyr Thr Ile Ser Lys Leu
                85                  90                  95
Ile Thr Gln Lys Leu Asp Gly Leu Lys Asn Ser Glu Lys Leu Lys Glu
            100                 105                 110
Lys Ile Glu Asn Ala Lys Lys Cys Ser Glu Asp Phe Thr Lys Lys Leu
        115                 120                 125
Glu Gly Glu His Ala Gln Leu Gly Ile Glu Asn Val Thr Asp Glu Asn
    130                 135                 140
Ala Lys Lys Ala Ile Leu Ile Thr Asp Ala Ala Lys Asp Lys Gly Ala
145                 150                 155                 160
Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ala Lys Ala
                165                 170                 175
Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser Pro Ile
            180                 185                 190
Val
```

<210> 23
<211> 1128
<212> DNA
<213> Artificial Sequence

<220>
<223> OspC Chimera

<221> CDS
<222> (1)...(1128)

<400> 23

```
atg gct tgt aat aat tca ggg aaa gat ggg aat aca tct gca aat tct   48
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
 1               5                  10                  15

gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa aaa   96
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
            20                  25                  30

att acg gat tct aat gcg gtt tta ctt gct gtg aaa gag gtt gaa gcg   144
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
        35                  40                  45

ttg ctg tca tct ata gat gaa att gct gct aaa gct att ggt aaa aaa   192
Leu Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys
    50                  55                  60

ata cac caa aat aat ggt ttg gat acc gaa tat aat cac aat gga tca   240
Ile His Gln Asn Asn Gly Leu Asp Thr Glu Tyr Asn His Asn Gly Ser
65                  70                  75                  80
```

Sub A1

```
ttg tta gcg gga gct tat gca ata tca acc cta ata aaa caa aaa tta   288
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu
                85                  90                  95

gat gga ttg aaa aat gaa gga tta aag gaa aaa att gat gcg gct aag   336
Asp Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys
            100                 105                 110

aaa tgt tct gaa aca ttt act aat aaa tta aaa gaa aaa cac aca gat   384
Lys Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp
        115                 120                 125

ctt ggt aaa gaa ggt gtt act gat gct gat gca aaa gaa gcc att tta   432
Leu Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu
    130                 135                 140

aaa aca aat ggt act aaa act aaa ggt gct gaa gaa ctt gga aaa tta   480
Lys Thr Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu
145                 150                 155                 160

ttt gaa tca gta gag gtc ttg tca aaa gca gct aaa gag atg ctt gct   528
Phe Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala
                165                 170                 175

aat tca gtt aaa gag ctt aca agc cct gtt gtg gca gaa agt cca gcc   576
Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Ala
            180                 185                 190

atg gta aat aat tca ggg aaa gat ggg aat aca tct gca aat tct gct   624
Met Val Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala
        195                 200                 205

gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa aaa att   672
Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile
    210                 215                 220

aca gaa tct aac gca gtt gtt ctc gcc gtg aaa gaa gtt gaa act ttg   720
Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val Glu Thr Leu
225                 230                 235                 240

ctt aca tct ata gat gag ctt gct aaa gct att ggt aaa aaa ata aaa   768
Leu Thr Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys Lys Ile Lys
                245                 250                 255

aac gat gtt agt tta gat aat gag gca gat cac aac gga tca tta ata   816
Asn Asp Val Ser Leu Asp Asn Glu Ala Asp His Asn Gly Ser Leu Ile
            260                 265                 270

tca gga gca tat tta att tca aac tta ata aca aaa aaa ata agt gca   864
Ser Gly Ala Tyr Leu Ile Ser Asn Leu Ile Thr Lys Lys Ile Ser Ala
        275                 280                 285

ata aaa gat tca gga gaa ttg aag gca gaa att gaa aag gct aag aaa   912
Ile Lys Asp Ser Gly Glu Leu Lys Ala Glu Ile Glu Lys Ala Lys Lys
    290                 295                 300

tgt tct gaa gaa ttt act gct aaa tta aaa ggt gaa cac aca gat ctt   960
Cys Ser Glu Glu Phe Thr Ala Lys Leu Lys Gly Glu His Thr Asp Leu
305                 310                 315                 320
```

Sub A1

```
ggt aaa gaa ggc gtt act gat gat aat gca aaa aaa gcc att tta aaa   1008
Gly Lys Glu Gly Val Thr Asp Asp Asn Ala Lys Lys Ala Ile Leu Lys
        325                 330                 335

aca aat aat gat aaa act aag ggc gct gat gaa ctt gaa aag tta ttt   1056
Thr Asn Asn Asp Lys Thr Lys Gly Ala Asp Glu Leu Glu Lys Leu Phe
    340                 345                 350

gaa tca gta aaa aac ttg tca aaa gca gct aaa gag atg ctt act aat   1104
Glu Ser Val Lys Asn Leu Ser Lys Ala Ala Lys Glu Met Leu Thr Asn
355                 360                 365

tca gtt aaa gag ctt aca agc taa                                  1128
Ser Val Lys Glu Leu Thr Ser  *
370                 375
```

<210> 24
<211> 374
<212> PRT
<213> Artificial Sequence

<220>
<223> OspC Chimera

<400> 24

```
Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala
 1               5                  10                  15
Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile
            20                  25                  30
Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala Leu
        35                  40                  45
Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys Ile
    50                  55                  60
His Gln Asn Asn Gly Leu Asp Thr Glu Tyr Asn His Asn Gly Ser Leu
65                  70                  75                  80
Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu Asp
                85                  90                  95
Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys Lys
            100                 105                 110
Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp Leu
        115                 120                 125
Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu Lys
    130                 135                 140
Thr Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu Phe
145                 150                 155                 160
Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala Asn
                165                 170                 175
Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Ala Met
            180                 185                 190
Val Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp
        195                 200                 205
Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr
    210                 215                 220
Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val Glu Thr Leu Leu
225                 230                 235                 240
Thr Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys Lys Ile Lys Asn
                245                 250                 255
```

Sub A1

```
Asp Val Ser Leu Asp Asn Glu Ala Asp His Asn Gly Ser Leu Ile Ser
        260                 265                 270
Gly Ala Tyr Leu Ile Ser Asn Leu Ile Thr Lys Lys Ile Ser Ala Ile
    275                 280                 285
Lys Asp Ser Gly Glu Leu Lys Ala Glu Ile Glu Lys Ala Lys Lys Cys
290                 295                 300
Ser Glu Glu Phe Thr Ala Lys Leu Lys Gly Glu His Thr Asp Leu Gly
305                 310                 315                 320
Lys Glu Gly Val Thr Asp Asp Asn Ala Lys Lys Ala Ile Leu Lys Thr
                325                 330                 335
Asn Asn Asp Lys Thr Lys Gly Ala Asp Glu Leu Glu Lys Leu Phe Glu
            340                 345                 350
Ser Val Lys Asn Leu Ser Lys Ala Ala Lys Glu Met Leu Thr Asn Ser
        355                 360                 365
Val Lys Glu Leu Thr Ser
    370
```

<210> 25
<211> 1124
<212> DNA
<213> Artificial Sequence

<220>
<223> OspC Chimera

<221> CDS
<222> (1)...(1124)

<400> 25

```
atg gct tgt aat aat tca ggg aaa gat ggg aat aca tct gca aat tct   48
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
 1               5                  10                  15

gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa aaa   96
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
            20                  25                  30

att acg gat tct aat gcg gtt tta ctt gct gtg aaa gag gtt gaa gcg   144
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
        35                  40                  45

ttg ctg tca tct ata gat gaa att gct gct aaa gct att ggt aaa aaa   192
Leu Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys
    50                  55                  60

ata cac caa aat aat ggt ttg gat acc gaa tat aat cac aat gga tca   240
Ile His Gln Asn Asn Gly Leu Asp Thr Glu Tyr Asn His Asn Gly Ser
65                  70                  75                  80

ttg tta gcg gga gct tat gca ata tca acc cta ata aaa caa aaa tta   288
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu
                85                  90                  95

gat gga ttg aaa aat gaa gga tta aag gaa aaa att gat gcg gct aag   336
Asp Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys
            100                 105                 110
```

```
aaa tgt tct gaa aca ttt act aat aaa tta aaa gaa aaa cac aca gat   384
Lys Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp
        115                 120                 125

ctt ggt aaa gaa ggt gtt act gat gct gat gca aaa gaa gcc att tta   432
Leu Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu
    130                 135                 140

aaa aca aat ggt act aaa act aaa ggt gct gaa gaa ctt gga aaa tta   480
Lys Thr Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu
145                 150                 155                 160

ttt gaa tca gta gag gtc ttg tca aaa gca gct aaa gag atg ctt gct   528
Phe Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala
                165                 170                 175.

aat tca gtt aaa gag ctt aca agc cct gtt gtg gca gaa agt cca gcc   576
Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Ala
            180                 185                 190

atg gta aat aat tca gga aaa gat ggg aat aca tct gca aat tct gct   624
Met Val Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala
        195                 200                 205

gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa aaa att   672
Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile
    210                 215                 220

aca gaa tct aac gca gtt gtt ctg gct gtg aaa gaa att gaa act ttg   720
Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Ile Glu Thr Leu
225                 230                 235                 240

ctt gca tct ata gat gaa ctt gct act aaa gct att ggt aaa aaa ata   768
Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys Ile
                245                 250                 255

caa caa aat ggt ggt tta gct gtc gaa gcg ggg cat aat gga aca ttg   816
Gln Gln Asn Gly Gly Leu Ala Val Glu Ala Gly His Asn Gly Thr Leu
            260                 265                 270

tta gca ggt gct tat aca ata tca aaa cta ata aca caa aaa tta gat   864
Leu Ala Gly Ala Tyr Thr Ile Ser Lys Leu Ile Thr Gln Lys Leu Asp
        275                 280                 285

gga ttg aaa aat tca gaa aaa tta aag gaa aaa att gaa aat gct aag   912
Gly Leu Lys Asn Ser Glu Lys Leu Lys Glu Lys Ile Glu Asn Ala Lys
    290                 295                 300

aaa tgt tct gaa gat ttt act aaa aaa cta gaa gga gaa cat gcg caa   960
Lys Cys Ser Glu Asp Phe Thr Lys Lys Leu Glu Gly Glu His Ala Gln
305                 310                 315                 320

ctt gga att gaa aat gtt act gat gag aat gca aaa aaa gct att tta  1008
Leu Gly Ile Glu Asn Val Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu
                325                 330                 335

ata aca gat gca gct aaa gat aag ggc gct gca gag ctt gaa aag cta  1056
Ile Thr Asp Ala Ala Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu
            340                 345                 350
```

Sub A1

```
ttt aaa gca gta gaa aac ttg gca aaa gca gct aaa gag atg ctt gct   1104
Phe Lys Ala Val Glu Asn Leu Ala Lys Ala Ala Lys Glu Met Leu Ala
        355                 360                 365

                                                                 1124
aat tca gtt aaa gag ctt ac
Asn Ser Val Lys Glu Leu
    370
```

<210> 26
<211> 373
<212> PRT
<213> Artificial Sequence

<220>
<223> OspC Chimera

<400> 26

```
Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala
 1               5                  10                  15
Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile
            20                  25                  30
Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala Leu
        35                  40                  45
Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys Ile
    50                  55                  60
His Gln Asn Asn Gly Leu Asp Thr Glu Tyr Asn His Asn Gly Ser Leu
65                  70                  75                  80
Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu Asp
                85                  90                  95
Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys Lys
            100                 105                 110
Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp Leu
        115                 120                 125
Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu Lys
    130                 135                 140
Thr Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu Phe
145                 150                 155                 160
Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala Asn
                165                 170                 175
Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Ala Met
            180                 185                 190
Val Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp
        195                 200                 205
Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr
    210                 215                 220
Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Ile Glu Thr Leu Leu
225                 230                 235                 240
Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys Ile Gln
                245                 250                 255
Gln Asn Gly Gly Leu Ala Val Glu Ala Gly His Asn Gly Thr Leu Leu
            260                 265                 270
Ala Gly Ala Tyr Thr Ile Ser Lys Leu Ile Thr Gln Lys Leu Asp Gly
        275                 280                 285
Leu Lys Asn Ser Glu Lys Leu Lys Glu Lys Ile Glu Asn Ala Lys Lys
    290                 295                 300
Cys Ser Glu Asp Phe Thr Lys Lys Leu Glu Gly Glu His Ala Gln Leu
305                 310                 315                 320
```

Sub A1

```
Gly Ile Glu Asn Val Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu Ile
                325                 330                 335
Thr Asp Ala Ala Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe
            340                 345                 350
Lys Ala Val Glu Asn Leu Ala Lys Ala Ala Lys Glu Met Leu Ala Asn
        355                 360                 365
Ser Val Lys Glu Leu
    370
```

<210> 27
<211> 1137
<212> DNA
<213> Artificial Sequence

<220>
<223> OspC Chimera

<221> CDS
<222> (1)...(1137)

<400> 27

```
atg gct tgt aat aat tca ggg aaa gat ggg aat aca tct gca aat tct   48
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
 1               5                  10                  15

gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata aat aaa aaa   96
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Asn Lys Lys
            20                  25                  30

att acg gat tct aat gcg gtt tta ctt gct gtg aaa gag gtt gaa gcg   144
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
        35                  40                  45

ttg ctg tca tct ata gat gaa att gct gct aaa gct att ggt aaa aaa   192
Leu Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys
    50                  55                  60

ata cac caa aat aat ggt ttg gat acc gaa aat aat cac aat gga tca   240
Ile His Gln Asn Asn Gly Leu Asp Thr Glu Asn Asn His Asn Gly Ser
65                  70                  75                  80

ttg tta gcg gga gct tat gca ata tca acc cta ata aaa caa aaa tta   288
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu
                85                  90                  95

gat gga ttg aaa aat gaa gga tta aag gaa aaa att gat gcg gct aag   336
Asp Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys
            100                 105                 110

aaa tgt tct gaa aca ttt act aat aaa tta aaa gaa aaa cac aca gat   384
Lys Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp
        115                 120                 125

ctt ggt aaa gaa ggt gtt act gat gct gat gca aaa gaa gcc att tta   432
Leu Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu
    130                 135                 140
```

```
aaa gca aat ggt act aaa act aaa ggt gct gaa gaa ctt gga aaa tta   480
Lys Ala Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu
145                 150                 155                 160

ttt gaa tca gta gag gtc ttg tca aaa gca gct aaa gag atg ctt gct   528
Phe Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala
                165                 170                 175

aat tca gtt aaa gag ctt aca agc cct gtt gtg gca gaa agt cca aaa   576
Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Lys
            180                 185                 190

aaa cct tcc atg gta aat aat tca ggg aaa gat ggg aat aca tct gca   624
Lys Pro Ser Met Val Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala
        195                 200                 205

aat tct gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt   672
Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser
    210                 215                 220

aaa aaa att aca gaa tct aac gca gtt gtt ctc gcc gtg aaa gaa gtt   720
Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val
225                 230                 235                 240

gaa act ttg ctt aca tct ata gat gag ctt gct aaa gct att ggt aaa   768
Glu Thr Leu Leu Thr Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys
                245                 250                 255

aaa ata aaa aac gat gtt agt tta gat aat gag gca gat cac aac gga   816
Lys Ile Lys Asn Asp Val Ser Leu Asp Asn Glu Ala Asp His Asn Gly
            260                 265                 270

tca tta ata tca gga gca tat tta att tca aac tta ata aca aaa aaa   864
Ser Leu Ile Ser Gly Ala Tyr Leu Ile Ser Asn Leu Ile Thr Lys Lys
        275                 280                 285

ata agt gca ata aaa gat tca gga gaa ttg aag gca gaa att gaa aag   912
Ile Ser Ala Ile Lys Asp Ser Gly Glu Leu Lys Ala Glu Ile Glu Lys
    290                 295                 300

gct aag aaa tgt tct gaa gaa ttt act gct aaa tta aaa ggt gaa cac   960
Ala Lys Lys Cys Ser Glu Glu Phe Thr Ala Lys Leu Lys Gly Glu His
305                 310                 315                 320

aca gat ctt ggt aaa gaa ggc gtt act gat gat aat gca aaa aaa gcc  1008
Thr Asp Leu Gly Lys Glu Gly Val Thr Asp Asp Asn Ala Lys Lys Ala
                325                 330                 335

att tta aaa aca aat aat gat aaa act aag ggc gct gat gaa ctt gaa  1056
Ile Leu Lys Thr Asn Asn Asp Lys Thr Lys Gly Ala Asp Glu Leu Glu
            340                 345                 350

aag tta ttt gaa tca gta aaa aac ttg tca aaa gca gct aaa gag atg  1104
Lys Leu Phe Glu Ser Val Lys Asn Leu Ser Lys Ala Ala Lys Glu Met
        355                 360                 365

ctt act aat tca gtt aaa gag ctt aca agc taa                     1137
Leu Thr Asn Ser Val Lys Glu Leu Thr Ser  *
    370                 375
```

<210> 28
<211> 378
<212> PRT
<213> Artificial Sequence

<220>
<223> OspC Chimera

<400> 28

```
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
 1               5                  10                  15
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Asn Lys Lys
            20                  25                  30
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
        35                  40                  45
Leu Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys
    50                  55                  60
Ile His Gln Asn Asn Gly Leu Asp Thr Glu Asn Asn His Asn Gly Ser
65                  70                  75                  80
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu
                85                  90                  95
Asp Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys
            100                 105                 110
Lys Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp
        115                 120                 125
Leu Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu
    130                 135                 140
Lys Ala Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu
145                 150                 155                 160
Phe Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala
                165                 170                 175
Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Lys
            180                 185                 190
Lys Pro Ser Met Val Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala
        195                 200                 205
Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser
    210                 215                 220
Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val
225                 230                 235                 240
Glu Thr Leu Leu Thr Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys
                245                 250                 255
Lys Ile Lys Asn Asp Val Ser Leu Asp Asn Glu Ala Asp His Asn Gly
            260                 265                 270
Ser Leu Ile Ser Gly Ala Tyr Leu Ile Ser Asn Leu Ile Thr Lys Lys
        275                 280                 285
Ile Ser Ala Ile Lys Asp Ser Gly Glu Leu Lys Ala Glu Ile Glu Lys
    290                 295                 300
Ala Lys Lys Cys Ser Glu Glu Phe Thr Ala Lys Leu Lys Gly Glu His
305                 310                 315                 320
Thr Asp Leu Gly Lys Glu Gly Val Thr Asp Asp Asn Ala Lys Lys Ala
                325                 330                 335
Ile Leu Lys Thr Asn Asn Asp Lys Thr Lys Gly Ala Asp Glu Leu Glu
            340                 345                 350
Lys Leu Phe Glu Ser Val Lys Asn Leu Ser Lys Ala Ala Lys Glu Met
        355                 360                 365
Leu Thr Asn Ser Val Lys Glu Leu Thr Ser
    370                 375
```

Sub A1

<210> 29
<211> 1133
<212> DNA
<213> Artificial Sequence

<220>
<223> OspC Chimera

<221> CDS
<222> (1)...(1133)

<400> 29

```
atg gct tgt aat aat tca ggg aaa gat ggg aat aca tct gca aat tct   48
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
 1               5                  10                  15

gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata aat aaa aaa   96
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Asn Lys Lys
            20                  25                  30

att acg gat tct aat gcg gtt tta ctt gct gtg aaa gag gtt gaa gcg   144
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
        35                  40                  45

ttg ctg tca tct ata gat gaa att gct gct aaa gct att ggt aaa aaa   192
Leu Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys
    50                  55                  60

ata cac caa aat aat ggt ttg gat acc gaa aat aat cac aat gga tca   240
Ile His Gln Asn Asn Gly Leu Asp Thr Glu Asn Asn His Asn Gly Ser
65                  70                  75                  80

ttg tta gcg gga gct tat gca ata tca acc cta ata aaa caa aaa tta   288
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu
                85                  90                  95

gat gga ttg aaa aat gaa gga tta aag gaa aaa att gat gcg gct aag   336
Asp Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys
            100                 105                 110

aaa tgt tct gaa aca ttt act aat aaa tta aaa gaa aaa cac aca gat   384
Lys Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp
        115                 120                 125

ctt ggt aaa gaa ggt gtt act gat gct gat gca aaa gaa gcc att tta   432
Leu Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu
    130                 135                 140

aaa gca aat ggt act aaa act aaa ggt gct gaa gaa ctt gga aaa tta   480
Lys Ala Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu
145                 150                 155                 160

ttt gaa tca gta gag gtc ttg tca aaa gca gct aaa gag atg ctt gct   528
Phe Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala
                165                 170                 175
```

```
aat tca gtt aaa gag ctt aca agc cct gtt gtg gca gaa agt cca aaa   576
Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Lys
            180                 185                 190

aaa cct tcc atg gta aat aat tca gga aaa gat ggg aat aca tct gca   624
Lys Pro Ser Met Val Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala
        195                 200                 205

aat tct gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt   672
Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser
    210                 215                 220

aaa aaa att aca gaa tct aac gca gtt gtt ctg gct gtg aaa gaa att   720
Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Ile
225                 230                 235                 240

gaa act ttg ctt gca tct ata gat gaa ctt gct act aaa gct att ggt   768
Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly
                245                 250                 255

aaa aaa ata caa caa aat ggt ggt tta gct gtc gaa gcg ggg cat aat   816
Lys Lys Ile Gln Gln Asn Gly Gly Leu Ala Val Glu Ala Gly His Asn
            260                 265                 270

gga aca ttg tta gca ggt gct tat aca ata tca aaa cta ata aca caa   864
Gly Thr Leu Leu Ala Gly Ala Tyr Thr Ile Ser Lys Leu Ile Thr Gln
        275                 280                 285

aaa tta gat gga ttg aaa aat tca gaa aaa tta aag gaa aaa att gaa   912
Lys Leu Asp Gly Leu Lys Asn Ser Glu Lys Leu Lys Glu Lys Ile Glu
    290                 295                 300

aat gct aag aaa tgt tct gaa gat ttt act aaa aaa cta gaa gga gaa   960
Asn Ala Lys Lys Cys Ser Glu Asp Phe Thr Lys Lys Leu Glu Gly Glu
305                 310                 315                 320

cat gcg caa ctt gga att gaa aat gtt act gat gag aat gca aaa aaa  1008
His Ala Gln Leu Gly Ile Glu Asn Val Thr Asp Glu Asn Ala Lys Lys
                325                 330                 335

gct att tta ata aca gat gca gct aaa gat aag ggc gct gca gag ctt  1056
Ala Ile Leu Ile Thr Asp Ala Ala Lys Asp Lys Gly Ala Ala Glu Leu
            340                 345                 350

gaa aag cta ttt aaa gca gta gaa aac ttg gca aaa gca gct aaa gag  1104
Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ala Lys Ala Ala Lys Glu
        355                 360                 365

atg ctt gct aat tca gtt aaa gag ctt ac                          1133
Met Leu Ala Asn Ser Val Lys Glu Leu
    370                 375
```

<210> 30
<211> 377
<212> PRT
<213> Artificial Sequence

Sub A1

<220>
<223> OspC Chimera

<400> 30

```
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
 1               5                  10                  15
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Asn Lys Lys
            20                  25                  30
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
        35                  40                  45
Leu Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys
    50                  55                  60
Ile His Gln Asn Asn Gly Leu Asp Thr Glu Asn Asn His Asn Gly Ser
65                  70                  75                  80
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu
                85                  90                  95
Asp Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys
            100                 105                 110
Lys Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp
        115                 120                 125
Leu Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu
    130                 135                 140
Lys Ala Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu
145                 150                 155                 160
Phe Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala
                165                 170                 175
Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Lys
            180                 185                 190
Lys Pro Ser Met Val Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala
        195                 200                 205
Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser
    210                 215                 220
Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Ile
225                 230                 235                 240
Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly
                245                 250                 255
Lys Lys Ile Gln Gln Asn Gly Gly Leu Ala Val Glu Ala Gly His Asn
            260                 265                 270
Gly Thr Leu Leu Ala Gly Ala Tyr Thr Ile Ser Lys Leu Ile Thr Gln
        275                 280                 285
Lys Leu Asp Gly Leu Lys Asn Ser Glu Lys Leu Lys Glu Lys Ile Glu
    290                 295                 300
Asn Ala Lys Lys Cys Ser Glu Asp Phe Thr Lys Lys Leu Glu Gly Glu
305                 310                 315                 320
His Ala Gln Leu Gly Ile Glu Asn Val Thr Asp Glu Asn Ala Lys Lys
                325                 330                 335
Ala Ile Leu Ile Thr Asp Ala Ala Lys Asp Lys Gly Ala Ala Glu Leu
            340                 345                 350
Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ala Lys Ala Ala Lys Glu
        355                 360                 365
Met Leu Ala Asn Ser Val Lys Glu Leu
    370                 375
```

<210> 31
<211> 1112
<212> DNA
<213> Artificial Sequence

Sub A1

<220>
<223> OspC Chimera

<221> CDS
<222> (1)...(1112)

<400> 31
atg gct tgt aat aat tca ggg aaa gat ggg aat aca tct gca aat tct 48
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
1 5 10 15

gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa aaa 96
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
20 25 30

att acg gat tct aat gcg gtt tta ctt gct gtg aaa gag gtt gaa gcg 144
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
35 40 45

ttg ctg tca tct ata gat gag ctt gct aaa gct att ggt aaa aaa ata 192
Leu Leu Ser Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys Lys Ile
50 55 60

aaa aac gat ggt agt tta gat aat gaa gca aat cgc aac gag tca ttg 240
Lys Asn Asp Gly Ser Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser Leu
65 70 75 80

tta gca gga gct tat aca ata tca acc tta ata aca caa aaa tta agt 288
Leu Ala Gly Ala Tyr Thr Ile Ser Thr Leu Ile Thr Gln Lys Leu Ser
85 90 95

aaa tta aac gga tca gaa ggt tta aag gaa aag att gcc gca gct aag 336
Lys Leu Asn Gly Ser Glu Gly Leu Lys Glu Lys Ile Ala Ala Ala Lys
100 105 110

aaa tgc tct gaa gag ttt agt act aaa cta aaa gat aat cat gca cag 384
Lys Cys Ser Glu Glu Phe Ser Thr Lys Leu Lys Asp Asn His Ala Gln
115 120 125

ctt ggt ata cag ggc gtt act gat gaa aat gca aaa aaa gct att tta 432
Leu Gly Ile Gln Gly Val Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu
130 135 140

aaa gca aat gca gcg ggt aaa gat aag ggc gtt gaa gaa ctt gaa aag 480
Lys Ala Asn Ala Ala Gly Lys Asp Lys Gly Val Glu Glu Leu Glu Lys
145 150 155 160

ttg tcc gga tca tta gaa agc tta tca aaa gca gct aaa gag atg ctt 528
Leu Ser Gly Ser Leu Glu Ser Leu Ser Lys Ala Ala Lys Glu Met Leu
165 170 175

gct aat tca gtt aaa gag ctt aca agc cct gtt gtc cat ggt aat aat 576
Ala Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val His Gly Asn Asn
180 185 190

tca aga aaa gat ggg aat gca tct aca aat tct gcc gat gag tct gtt 624
Ser Arg Lys Asp Gly Asn Ala Ser Thr Asn Ser Ala Asp Glu Ser Val
195 200 205

Sub A1

```
aaa ggg cct aat ctt aca gaa ata agt aaa aaa att aca gaa tct aac   672
Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn
    210                 215                 220

gca gtt gtt ctg gcc gtg aaa gaa gtt gag acc tta ctt gca tct ata   720
Ala Val Val Leu Ala Val Lys Glu Val Glu Thr Leu Leu Ala Ser Ile
225                 230                 235                 240

gat gaa ctt gct acc aaa gct att ggt aag aaa ata ggc aat aat ggt   768
Asp Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys Ile Gly Asn Asn Gly
                245                 250                 255

tta gag gcc aat cag agt aaa aac aca tca ttg tta tca gga gct tat   816
Leu Glu Ala Asn Gln Ser Lys Asn Thr Ser Leu Leu Ser Gly Ala Tyr
            260                 265                 270

gca ata tct gac cta ata gca gaa aaa tta aat gta ttg aaa aat gaa   864
Ala Ile Ser Asp Leu Ile Ala Glu Lys Leu Asn Val Leu Lys Asn Glu
        275                 280                 285

gaa tta aag gaa aag att gat aca gct aag caa tgt tct aca gaa ttt   912
Glu Leu Lys Glu Lys Ile Asp Thr Ala Lys Gln Cys Ser Thr Glu Phe
    290                 295                 300

act aat aaa cta aaa agt gaa cat gca gtg ctt ggt ctg gac aat ctt   960
Thr Asn Lys Leu Lys Ser Glu His Ala Val Leu Gly Leu Asp Asn Leu
305                 310                 315                 320

act gat gat aat gca caa aga gct att tta aaa aaa cat gca aat aaa  1008
Thr Asp Asp Asn Ala Gln Arg Ala Ile Leu Lys Lys His Ala Asn Lys
                325                 330                 335

gat aag ggt gct gca gaa ctt gaa aag tta ttt aaa gcg gta gaa aac  1056
Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn
            340                 345                 350

tta tca aaa gca gct caa gac aca tta aaa aat gct gtt aaa gag ctt  1104
Leu Ser Lys Ala Ala Gln Asp Thr Leu Lys Asn Ala Val Lys Glu Leu
        355                 360                 365

                                                                1112
aca agt cc
Thr Ser
    370
```

<210> 32
<211> 369
<212> PRT
<213> Artificial Sequence

<220>
<223> OspC Chimera

<400> 32

```
Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala
 1               5                  10                  15
Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile
            20                  25                  30
```

Sub A1

```
Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala Leu
        35                  40                  45
Leu Ser Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys Lys Ile Lys
    50                  55                  60
Asn Asp Gly Ser Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser Leu Leu
65                  70                  75                  80
Ala Gly Ala Tyr Thr Ile Ser Thr Leu Ile Thr Gln Lys Leu Ser Lys
                85                  90                  95
Leu Asn Gly Ser Glu Gly Leu Lys Glu Lys Ile Ala Ala Ala Lys Lys
            100                 105                 110
Cys Ser Glu Glu Phe Ser Thr Lys Leu Lys Asp Asn His Ala Gln Leu
        115                 120                 125
Gly Ile Gln Gly Val Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu Lys
    130                 135                 140
Ala Asn Ala Ala Gly Lys Asp Lys Gly Val Glu Glu Leu Glu Lys Leu
145                 150                 155                 160
Ser Gly Ser Leu Glu Ser Leu Ser Lys Ala Ala Lys Glu Met Leu Ala
                165                 170                 175
Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val His Gly Asn Asn Ser
            180                 185                 190
Arg Lys Asp Gly Asn Ala Ser Thr Asn Ser Ala Asp Glu Ser Val Lys
        195                 200                 205
Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala
    210                 215                 220
Val Val Leu Ala Val Lys Glu Val Glu Thr Leu Leu Ala Ser Ile Asp
225                 230                 235                 240
Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys Ile Gly Asn Asn Gly Leu
                245                 250                 255
Glu Ala Asn Gln Ser Lys Asn Thr Ser Leu Leu Ser Gly Ala Tyr Ala
            260                 265                 270
Ile Ser Asp Leu Ile Ala Glu Lys Leu Asn Val Leu Lys Asn Glu Glu
        275                 280                 285
Leu Lys Glu Lys Ile Asp Thr Ala Lys Gln Cys Ser Thr Glu Phe Thr
    290                 295                 300
Asn Lys Leu Lys Ser Glu His Ala Val Leu Gly Leu Asp Asn Leu Thr
305                 310                 315                 320
Asp Asp Asn Ala Gln Arg Ala Ile Leu Lys Lys His Ala Asn Lys Asp
                325                 330                 335
Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu
            340                 345                 350
Ser Lys Ala Ala Gln Asp Thr Leu Lys Asn Ala Val Lys Glu Leu Thr
        355                 360                 365
Ser
```

<210> 33
<211> 1113
<212> DNA
<213> Artificial Sequence

<220>
<223> OspC Chimera

<221> CDS
<222> (1)...(1113)

<400> 33

Sub A1

```
atg gct tgt aat aat tca ggg aaa gat ggg aat aca tct gca aat tct   48
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
 1               5                  10                  15

gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa aaa   96
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
            20                  25                  30

att acg gat tct aat gcg gtt tta ctt gct gtg aaa gag gtt gaa gcg   144
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
        35                  40                  45

ttg ctg tca tct ata gat gag ctt gct aaa gct att ggt aaa aaa ata   192
Leu Leu Ser Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys Lys Ile
    50                  55                  60

aaa aac gat ggt agt tta gat aat gaa gca aat cgc aac gag tca ttg   240
Lys Asn Asp Gly Ser Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser Leu
65                  70                  75                  80

tta gca gga gct tat aca ata tca acc tta ata aca caa aaa tta agt   288
Leu Ala Gly Ala Tyr Thr Ile Ser Thr Leu Ile Thr Gln Lys Leu Ser
                85                  90                  95

aaa tta aac gga tca gaa ggt tta aag gaa aag att gcc gca gct aag   336
Lys Leu Asn Gly Ser Glu Gly Leu Lys Glu Lys Ile Ala Ala Ala Lys
            100                 105                 110

aaa tgc tct gaa gag ttt agt act aaa cta aaa gat aat cat gca cag   384
Lys Cys Ser Glu Glu Phe Ser Thr Lys Leu Lys Asp Asn His Ala Gln
        115                 120                 125

ctt ggt ata cag ggc gtt act gat gaa aat gca aaa aaa gct att tta   432
Leu Gly Ile Gln Gly Val Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu
    130                 135                 140

aaa gca aat gca gcg ggt aaa gat aag ggc gtt gaa gaa ctt gaa aag   480
Lys Ala Asn Ala Ala Gly Lys Asp Lys Gly Val Glu Glu Leu Glu Lys
145                 150                 155                 160

ttg tcc gga tca tta gaa agc tta tca aaa gca gct aaa gag atg ctt   528
Leu Ser Gly Ser Leu Glu Ser Leu Ser Lys Ala Ala Lys Glu Met Leu
                165                 170                 175

gct aat tca gtt aaa gag ctt aca agc cct gtt gtc cat ggt aat aat   576
Ala Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val His Gly Asn Asn
            180                 185                 190

tca ggg aaa gat ggg aat aca tct gca aat tct gct gat gag tct gtt   624
Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val
        195                 200                 205

aaa ggg cct aat ctt aca gaa ata agt aaa aaa att aca gaa tct aac   672
Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn
    210                 215                 220

gca gtt gtt ctc gcc gtg aaa gaa gtt gaa act ttg ctt aca tct ata   720
Ala Val Val Leu Ala Val Lys Glu Val Glu Thr Leu Leu Thr Ser Ile
225                 230                 235                 240
```

```
gat gag ctt gct aaa gct att ggt aaa aaa ata aaa aac gat gtt agt   768
Asp Glu Leu Ala Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Val Ser
                245                 250                 255

tta gat aat gag gca gat cac aac gga tca tta ata tca gga gca tat   816
Leu Asp Asn Glu Ala Asp His Asn Gly Ser Leu Ile Ser Gly Ala Tyr
            260                 265                 270

tta att tca aac tta ata aca aaa aaa ata agt gca ata aaa gat tca   864
Leu Ile Ser Asn Leu Ile Thr Lys Lys Ile Ser Ala Ile Lys Asp Ser
        275                 280                 285

gga gaa ttg aag gca gaa att gaa aag gct aag aaa tgt tct gaa gaa   912
Gly Glu Leu Lys Ala Glu Ile Glu Lys Ala Lys Lys Cys Ser Glu Glu
    290                 295                 300

ttt act gct aaa tta aaa ggt gaa cac aca gat ctt ggt aaa gaa ggc   960
Phe Thr Ala Lys Leu Lys Gly Glu His Thr Asp Leu Gly Lys Glu Gly
305                 310                 315                 320

gtt act gat gat aat gca aaa aaa gcc att tta aaa aca aat aat gat   1008
Val Thr Asp Asp Asn Ala Lys Lys Ala Ile Leu Lys Thr Asn Asn Asp
                325                 330                 335

aaa act aag ggc gct gat gaa ctt gaa aag tta ttt gaa tca gta aaa   1056
Lys Thr Lys Gly Ala Asp Glu Leu Glu Lys Leu Phe Glu Ser Val Lys
            340                 345                 350

aac ttg tca aaa gca gct aaa gag atg ctt act aat tca gtt aaa gag   1104
Asn Leu Ser Lys Ala Ala Lys Glu Met Leu Thr Asn Ser Val Lys Glu
        355                 360                 365

ctt aca agc                                                     1113
Leu Thr Ser
    370


<210> 34
<211> 370
<212> PRT
<213> Artificial Sequence

<220>
<223> OspC Chimera

<400> 34
Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala
 1               5                  10                  15
Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile
            20                  25                  30
Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala Leu
        35                  40                  45
Leu Ser Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys Lys Ile Lys
    50                  55                  60
Asn Asp Gly Ser Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser Leu Leu
65                  70                  75                  80
Ala Gly Ala Tyr Thr Ile Ser Thr Leu Ile Thr Gln Lys Leu Ser Lys
                85                  90                  95
```

Sub A1

```
Leu Asn Gly Ser Glu Gly Leu Lys Glu Lys Ile Ala Ala Ala Lys Lys
            100                 105                 110
Cys Ser Glu Glu Phe Ser Thr Lys Leu Lys Asp Asn His Ala Gln Leu
        115                 120                 125
Gly Ile Gln Gly Val Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu Lys
    130                 135                 140
Ala Asn Ala Ala Gly Lys Asp Lys Gly Val Glu Glu Leu Glu Lys Leu
145                 150                 155                 160
Ser Gly Ser Leu Glu Ser Leu Ser Lys Ala Ala Lys Glu Met Leu Ala
                165                 170                 175
Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val His Gly Asn Asn Ser
            180                 185                 190
Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys
        195                 200                 205
Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala
    210                 215                 220
Val Val Leu Ala Val Lys Glu Val Glu Thr Leu Leu Thr Ser Ile Asp
225                 230                 235                 240
Glu Leu Ala Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Val Ser Leu
                245                 250                 255
Asp Asn Glu Ala Asp His Asn Gly Ser Leu Ile Ser Gly Ala Tyr Leu
            260                 265                 270
Ile Ser Asn Leu Ile Thr Lys Lys Ile Ser Ala Ile Lys Asp Ser Gly
        275                 280                 285
Glu Leu Lys Ala Glu Ile Glu Lys Ala Lys Lys Cys Ser Glu Glu Phe
    290                 295                 300
Thr Ala Lys Leu Lys Gly Glu His Thr Asp Leu Gly Lys Glu Gly Val
305                 310                 315                 320
Thr Asp Asp Asn Ala Lys Lys Ala Ile Leu Lys Thr Asn Asn Asp Lys
                325                 330                 335
Thr Lys Gly Ala Asp Glu Leu Glu Lys Leu Phe Glu Ser Val Lys Asn
            340                 345                 350
Leu Ser Lys Ala Ala Lys Glu Met Leu Thr Asn Ser Val Lys Glu Leu
        355                 360                 365
Thr Ser
    370
```

<210> 35
<211> 1112
<212> DNA
<213> Artificial Sequence

<220>
<223> OspC Chimera

<221> CDS
<222> (1)...(1112)

<400> 35

```
atg gct tgt aat aat tca ggg aaa gat ggg aat aca tct gca aat tct    48
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
 1               5                  10                  15

gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa aaa    96
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
            20                  25                  30
```

Sub-A1

```
att acg gat tct aat gcg gtt tta ctt gct gtg aaa gag gtt gaa gcg   144
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
         35                  40                  45

ttg ctg tca tct ata gat gag ctt gct aaa gct att ggt aaa aaa ata   192
Leu Leu Ser Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys Lys Ile
     50                  55                  60

aaa aac gat ggt agt tta gat aat gaa gca aat cgc aac gag tca ttg   240
Lys Asn Asp Gly Ser Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser Leu
 65                  70                  75                  80

tta gca gga gct tat aca ata tca acc tta ata aca caa aaa tta agt   288
Leu Ala Gly Ala Tyr Thr Ile Ser Thr Leu Ile Thr Gln Lys Leu Ser
                 85                  90                  95

aaa tta aac gga tca gaa ggt tta aag gaa aag att gcc gca gct aag   336
Lys Leu Asn Gly Ser Glu Gly Leu Lys Glu Lys Ile Ala Ala Ala Lys
            100                 105                 110

aaa tgc tct gaa gag ttt agt act aaa cta aaa gat aat cat gca cag   384
Lys Cys Ser Glu Glu Phe Ser Thr Lys Leu Lys Asp Asn His Ala Gln
        115                 120                 125

ctt ggt ata cag ggc gtt act gat gaa aat gca aaa aaa gct att tta   432
Leu Gly Ile Gln Gly Val Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu
    130                 135                 140

aaa gca aat gca gcg ggt aaa gat aag ggc gtt gaa gaa ctt gaa aag   480
Lys Ala Asn Ala Ala Gly Lys Asp Lys Gly Val Glu Glu Leu Glu Lys
145                 150                 155                 160

ttg tcc gga tca tta gaa agc tta tca aaa gca gct aaa gag atg ctt   528
Leu Ser Gly Ser Leu Glu Ser Leu Ser Lys Ala Ala Lys Glu Met Leu
                165                 170                 175

gct aat tca gtt aaa gag ctt aca agc cct gtt gtc cat ggt aat aat   576
Ala Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val His Gly Asn Asn
            180                 185                 190

tca gga aaa gat ggg aat aca tct gca aat tct gct gat gag tct gtt   624
Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val
        195                 200                 205

aaa ggg cct aat ctt aca gaa ata agt aaa aaa att aca gaa tct aac   672
Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn
    210                 215                 220

gca gtt gtt ctg gct gtg aaa gaa att gaa act ttg ctt gca tct ata   720
Ala Val Val Leu Ala Val Lys Glu Ile Glu Thr Leu Leu Ala Ser Ile
225                 230                 235                 240

gat gaa ctt gct act aaa gct att ggt aaa aaa ata caa caa aat ggt   768
Asp Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys Ile Gln Gln Asn Gly
                245                 250                 255

ggt tta gct gtc gaa gcg ggg cat aat gga aca ttg tta gca ggt gct   816
Gly Leu Ala Val Glu Ala Gly His Asn Gly Thr Leu Leu Ala Gly Ala
            260                 265                 270
```

```
tat aca ata tca aaa cta ata aca caa aaa tta gat gga ttg aaa aat   864
Tyr Thr Ile Ser Lys Leu Ile Thr Gln Lys Leu Asp Gly Leu Lys Asn
        275                 280                 285

tca gaa aaa tta aag gaa aaa att gaa aat gct aag aaa tgt tct gaa   912
Ser Glu Lys Leu Lys Glu Lys Ile Glu Asn Ala Lys Lys Cys Ser Glu
    290                 295                 300

gat ttt act aaa aaa cta gaa gga gaa cat gcg caa ctt gga att gaa   960
Asp Phe Thr Lys Lys Leu Glu Gly Glu His Ala Gln Leu Gly Ile Glu
305                 310                 315                 320

aat gtt act gat gag aat gca aaa aaa gct att tta ata aca gat gca  1008
Asn Val Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu Ile Thr Asp Ala
                325                 330                 335

gct aaa gat aag ggc gct gca gag ctt gaa aag cta ttt aaa gca gta  1056
Ala Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe Lys Ala Val
            340                 345                 350

gaa aac ttg gca aaa gca gct aaa gag atg ctt gct aat tca gtt aaa  1104
Glu Asn Leu Ala Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys
        355                 360                 365

gag ctt ac                                                     1112
Glu Leu
    370


<210> 36
<211> 369
<212> PRT
<213> Artificial Sequence

<220>
<223> OspC Chimera

<400> 36
Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala
 1               5                  10                  15
Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile
            20                  25                  30
Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala Leu
        35                  40                  45
Leu Ser Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys Lys Ile Lys
    50                  55                  60
Asn Asp Gly Ser Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser Leu Leu
65                  70                  75                  80
Ala Gly Ala Tyr Thr Ile Ser Thr Leu Ile Thr Gln Lys Leu Ser Lys
                85                  90                  95
Leu Asn Gly Ser Glu Gly Leu Lys Glu Lys Ile Ala Ala Ala Lys Lys
            100                 105                 110
Cys Ser Glu Glu Phe Ser Thr Lys Leu Lys Asp Asn His Ala Gln Leu
        115                 120                 125
Gly Ile Gln Gly Val Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu Lys
    130                 135                 140
Ala Asn Ala Ala Gly Lys Asp Lys Gly Val Glu Glu Leu Glu Lys Leu
145                 150                 155                 160
```

```
Ser Gly Ser Leu Glu Ser Leu Ser Lys Ala Ala Lys Glu Met Leu Ala
                165                 170                 175
Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val His Gly Asn Asn Ser
            180                 185                 190
Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys
        195                 200                 205
Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala
    210                 215                 220
Val Val Leu Ala Val Lys Glu Ile Glu Thr Leu Leu Ala Ser Ile Asp
225                 230                 235                 240
Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys Ile Gln Gln Asn Gly Gly
                245                 250                 255
Leu Ala Val Glu Ala Gly His Asn Gly Thr Leu Leu Ala Gly Ala Tyr
            260                 265                 270
Thr Ile Ser Lys Leu Ile Thr Gln Lys Leu Asp Gly Leu Lys Asn Ser
        275                 280                 285
Glu Lys Leu Lys Glu Lys Ile Glu Asn Ala Lys Lys Cys Ser Glu Asp
    290                 295                 300
Phe Thr Lys Lys Leu Glu Gly Glu His Ala Gln Leu Gly Ile Glu Asn
305                 310                 315                 320
Val Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu Ile Thr Asp Ala Ala
                325                 330                 335
Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu
            340                 345                 350
Asn Leu Ala Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu
        355                 360                 365
Leu
```

<210> 37
<211> 1106
<212> DNA
<213> Artificial Sequence

<220>
<223> OspC Chimera

<221> CDS
<222> (1)...(1106)

<400> 37

```
atg gct tgt aat aat tca gga aaa gat ggg aat gca tct gca aat tct    48
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Ala Ser Ala Asn Ser
 1               5                  10                  15

gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa aaa    96
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
             20                  25                  30

att aca gaa tct aac gca gtt gtt ctg gcc gtg aaa gaa gtt gag acc   144
Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val Glu Thr
         35                  40                  45

tta ctt gca tct ata gat gaa ctt gct acc aaa gct att ggt aaa aaa   192
Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys
     50                  55                  60
```

Sub A1

```
ata ggc aat aat ggt tta gag gcc aat cag agt aaa aac aca tca ttg   240
Ile Gly Asn Asn Gly Leu Glu Ala Asn Gln Ser Lys Asn Thr Ser Leu
 65                  70                  75                  80

tta tca gga gct tat gca ata tct gac cta ata gca gaa aaa tta aat   288
Leu Ser Gly Ala Tyr Ala Ile Ser Asp Leu Ile Ala Glu Lys Leu Asn
                 85                  90                  95

gta ttg aaa aat gaa gaa tta aag gaa aag att gat aca gct aag caa   336
Val Leu Lys Asn Glu Glu Leu Lys Glu Lys Ile Asp Thr Ala Lys Gln
            100                 105                 110

tgt tct aca gaa ttt act aat aaa cta aaa agt gaa cat gca gtg ctt   384
Cys Ser Thr Glu Phe Thr Asn Lys Leu Lys Ser Glu His Ala Val Leu
        115                 120                 125

ggt ctg gac aat ctt act gat gat aat gca caa aga gct att tta aaa   432
Gly Leu Asp Asn Leu Thr Asp Asp Asn Ala Gln Arg Ala Ile Leu Lys
    130                 135                 140

aaa cat gca aat aaa gat aag ggt gct gca gaa ctt gaa aag tta ttt   480
Lys His Ala Asn Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe
145                 150                 155                 160

aaa gcg gta gaa aac tta tca aaa gca gct caa gac aca tta aaa aat   528
Lys Ala Val Glu Asn Leu Ser Lys Ala Ala Gln Asp Thr Leu Lys Asn
                165                 170                 175

gct gtt aaa gag ctt aca agt cct att gtc cat ggt aat aat tca aga   576
Ala Val Lys Glu Leu Thr Ser Pro Ile Val His Gly Asn Asn Ser Arg
            180                 185                 190

aaa gat ggg aat gca tct aca aat tct gcc gat gag tct gtt aaa ggg   624
Lys Asp Gly Asn Ala Ser Thr Asn Ser Ala Asp Glu Ser Val Lys Gly
        195                 200                 205

cct aat ctt aca gaa ata agt aaa aaa att aca gaa tct aac gca gtt   672
Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val
    210                 215                 220

gtt ctg gcc gtg aaa gaa gtt gag acc tta ctt gca tct ata gat gaa   720
Val Leu Ala Val Lys Glu Val Glu Thr Leu Leu Ala Ser Ile Asp Glu
225                 230                 235                 240

ctt gct acc aaa gct att ggt aag aaa ata ggc aat aat ggt tta gag   768
Leu Ala Thr Lys Ala Ile Gly Lys Lys Ile Gly Asn Asn Gly Leu Glu
                245                 250                 255

gcc aat cag agt aaa aac aca tca ttg tta tca gga gct tat gca ata   816
Ala Asn Gln Ser Lys Asn Thr Ser Leu Leu Ser Gly Ala Tyr Ala Ile
            260                 265                 270

tct gac cta ata gca gaa aaa tta aat gta ttg aaa aat gaa gaa tta   864
Ser Asp Leu Ile Ala Glu Lys Leu Asn Val Leu Lys Asn Glu Glu Leu
        275                 280                 285

aag gaa aag att gat aca gct aag caa tgt tct aca gaa ttt act aat   912
Lys Glu Lys Ile Asp Thr Ala Lys Gln Cys Ser Thr Glu Phe Thr Asn
    290                 295                 300
```

```
aaa cta aaa agt gaa cat gca gtg ctt ggt ctg gac aat ctt act gat   960
Lys Leu Lys Ser Glu His Ala Val Leu Gly Leu Asp Asn Leu Thr Asp
305                 310                 315                 320

gat aat gca caa aga gct att tta aaa aaa cat gca aat aaa gat aag   1008
Asp Asn Ala Gln Arg Ala Ile Leu Lys Lys His Ala Asn Lys Asp Lys
                325                 330                 335

ggt gct gca gaa ctt gaa aag tta ttt aaa gcg gta gaa aac tta tca   1056
Gly Ala Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ser
            340                 345                 350

aaa gca gct caa gac aca tta aaa aat gct gtt aaa gag ctt aca agt   1104
Lys Ala Ala Gln Asp Thr Leu Lys Asn Ala Val Lys Glu Leu Thr Ser
        355                 360                 365

cc                                                               1106
```

<210> 38
<211> 368
<212> PRT
<213> Artificial Sequence

<220>
<223> OspC Chimera

<400> 38

```
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Ala Ser Ala Asn Ser
 1               5                  10                  15
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
            20                  25                  30
Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val Glu Thr
        35                  40                  45
Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys
    50                  55                  60
Ile Gly Asn Asn Gly Leu Glu Ala Asn Gln Ser Lys Asn Thr Ser Leu
65                  70                  75                  80
Leu Ser Gly Ala Tyr Ala Ile Ser Asp Leu Ile Ala Glu Lys Leu Asn
                85                  90                  95
Val Leu Lys Asn Glu Glu Leu Lys Glu Lys Ile Asp Thr Ala Lys Gln
            100                 105                 110
Cys Ser Thr Glu Phe Thr Asn Lys Leu Lys Ser Glu His Ala Val Leu
        115                 120                 125
Gly Leu Asp Asn Leu Thr Asp Asp Asn Ala Gln Arg Ala Ile Leu Lys
    130                 135                 140
Lys His Ala Asn Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe
145                 150                 155                 160
Lys Ala Val Glu Asn Leu Ser Lys Ala Ala Gln Asp Thr Leu Lys Asn
                165                 170                 175
Ala Val Lys Glu Leu Thr Ser Pro Ile Val His Gly Asn Asn Ser Arg
            180                 185                 190
Lys Asp Gly Asn Ala Ser Thr Asn Ser Ala Asp Glu Ser Val Lys Gly
        195                 200                 205
Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val
    210                 215                 220
Val Leu Ala Val Lys Glu Val Glu Thr Leu Leu Ala Ser Ile Asp Glu
225                 230                 235                 240
```

```
Leu Ala Thr Lys Ala Ile Gly Lys Lys Ile Gly Asn Asn Gly Leu Glu
                245                 250                 255
Ala Asn Gln Ser Lys Asn Thr Ser Leu Leu Ser Gly Ala Tyr Ala Ile
            260                 265                 270
Ser Asp Leu Ile Ala Glu Lys Leu Asn Val Leu Lys Asn Glu Glu Leu
        275                 280                 285
Lys Glu Lys Ile Asp Thr Ala Lys Gln Cys Ser Thr Glu Phe Thr Asn
    290                 295                 300
Lys Leu Lys Ser Glu His Ala Val Leu Gly Leu Asp Asn Leu Thr Asp
305                 310                 315                 320
Asp Asn Ala Gln Arg Ala Ile Leu Lys Lys His Ala Asn Lys Asp Lys
                325                 330                 335
Gly Ala Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ser
            340                 345                 350
Lys Ala Ala Gln Asp Thr Leu Lys Asn Ala Val Lys Glu Leu Thr Ser
        355                 360                 365
```

<210> 39
<211> 1107
<212> DNA
<213> Artificial Sequence

<220>
<223> OspC Chimera

<221> CDS
<222> (1)...(1107)

<400> 39

```
atg gct tgt aat aat tca gga aaa gat ggg aat gca tct gca aat tct   48
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Ala Ser Ala Asn Ser
 1               5                  10                  15

gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa aaa   96
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
            20                  25                  30

att aca gaa tct aac gca gtt gtt ctg gcc gtg aaa gaa gtt gag acc   144
Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val Glu Thr
        35                  40                  45

tta ctt gca tct ata gat gaa ctt gct acc aaa gct att ggt aaa aaa   192
Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys
    50                  55                  60

ata ggc aat aat ggt tta gag gcc aat cag agt aaa aac aca tca ttg   240
Ile Gly Asn Asn Gly Leu Glu Ala Asn Gln Ser Lys Asn Thr Ser Leu
65                  70                  75                  80

tta tca gga gct tat gca ata tct gac cta ata gca gaa aaa tta aat   288
Leu Ser Gly Ala Tyr Ala Ile Ser Asp Leu Ile Ala Glu Lys Leu Asn
                85                  90                  95

gta ttg aaa aat gaa gaa tta aag gaa aag att gat aca gct aag caa   336
Val Leu Lys Asn Glu Glu Leu Lys Glu Lys Ile Asp Thr Ala Lys Gln
            100                 105                 110
```

```
tgt tct aca gaa ttt act aat aaa cta aaa agt gaa cat gca gtg ctt      384
Cys Ser Thr Glu Phe Thr Asn Lys Leu Lys Ser Glu His Ala Val Leu
        115                 120                 125

ggt ctg gac aat ctt act gat gat aat gca caa aga gct att tta aaa      432
Gly Leu Asp Asn Leu Thr Asp Asp Asn Ala Gln Arg Ala Ile Leu Lys
    130                 135                 140

aaa cat gca aat aaa gat aag ggt gct gca gaa ctt gaa aag tta ttt      480
Lys His Ala Asn Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe
145                 150                 155                 160

aaa gcg gta gaa aac tta tca aaa gca gct caa gac aca tta aaa aat      528
Lys Ala Val Glu Asn Leu Ser Lys Ala Ala Gln Asp Thr Leu Lys Asn
                165                 170                 175

gct gtt aaa gag ctt aca agt cct att gtc cat ggt aat aat tca ggg      576
Ala Val Lys Glu Leu Thr Ser Pro Ile Val His Gly Asn Asn Ser Gly
            180                 185                 190

aaa gat ggg aat aca tct gca aat tct gct gat gag tct gtt aaa ggg      624
Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly
        195                 200                 205

cct aat ctt aca gaa ata agt aaa aaa att aca gaa tct aac gca gtt      672
Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val
    210                 215                 220

gtt ctc gcc gtg aaa gaa gtt gaa act ttg ctt aca tct ata gat gag      720
Val Leu Ala Val Lys Glu Val Glu Thr Leu Leu Thr Ser Ile Asp Glu
225                 230                 235                 240

ctt gct aaa gct att ggt aaa aaa ata aaa aac gat gtt agt tta gat      768
Leu Ala Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Val Ser Leu Asp
                245                 250                 255

aat gag gca gat cac aac gga tca tta ata tca gga gca tat tta att      816
Asn Glu Ala Asp His Asn Gly Ser Leu Ile Ser Gly Ala Tyr Leu Ile
            260                 265                 270

tca aac tta ata aca aaa aaa ata agt gca ata aaa gat tca gga gaa      864
Ser Asn Leu Ile Thr Lys Lys Ile Ser Ala Ile Lys Asp Ser Gly Glu
        275                 280                 285

ttg aag gca gaa att gaa aag gct aag aaa tgt tct gaa gaa ttt act      912
Leu Lys Ala Glu Ile Glu Lys Ala Lys Lys Cys Ser Glu Glu Phe Thr
    290                 295                 300

gct aaa tta aaa ggt gaa cac aca gat ctt ggt aaa gaa ggc gtt act      960
Ala Lys Leu Lys Gly Glu His Thr Asp Leu Gly Lys Glu Gly Val Thr
305                 310                 315                 320

gat gat aat gca aaa aaa gcc att tta aaa aca aat aat gat aaa act     1008
Asp Asp Asn Ala Lys Lys Ala Ile Leu Lys Thr Asn Asn Asp Lys Thr
                325                 330                 335

aag ggc gct gat gaa ctt gaa aag tta ttt gaa tca gta aaa aac ttg     1056
Lys Gly Ala Asp Glu Leu Glu Lys Leu Phe Glu Ser Val Lys Asn Leu
            340                 345                 350
```

tca aaa gca gct aaa gag atg ctt act aat tca gtt aaa gag ctt aca 1104
Ser Lys Ala Ala Lys Glu Met Leu Thr Asn Ser Val Lys Glu Leu Thr
355 360 365

agc 1107
Ser

<210> 40
<211> 368
<212> PRT
<213> Artificial Sequence

<220>
<223> OspC Chimera

<400> 40
Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Ala Ser Ala Asn Ser Ala
1 5 10 15
Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile
20 25 30
Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val Glu Thr Leu
35 40 45
Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys Ile
50 55 60
Gly Asn Asn Gly Leu Glu Ala Asn Gln Ser Lys Asn Thr Ser Leu Leu
65 70 75 80
Ser Gly Ala Tyr Ala Ile Ser Asp Leu Ile Ala Glu Lys Leu Asn Val
85 90 95
Leu Lys Asn Glu Glu Leu Lys Glu Lys Ile Asp Thr Ala Lys Gln Cys
100 105 110
Ser Thr Glu Phe Thr Asn Lys Leu Lys Ser Glu His Ala Val Leu Gly
115 120 125
Leu Asp Asn Leu Thr Asp Asp Asn Ala Gln Arg Ala Ile Leu Lys Lys
130 135 140
His Ala Asn Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe Lys
145 150 155 160
Ala Val Glu Asn Leu Ser Lys Ala Ala Gln Asp Thr Leu Lys Asn Ala
165 170 175
Val Lys Glu Leu Thr Ser Pro Ile Val His Gly Asn Asn Ser Gly Lys
180 185 190
Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro
195 200 205
Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val
210 215 220
Leu Ala Val Lys Glu Val Glu Thr Leu Leu Thr Ser Ile Asp Glu Leu
225 230 235 240
Ala Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Val Ser Leu Asp Asn
245 250 255
Glu Ala Asp His Asn Gly Ser Leu Ile Ser Gly Ala Tyr Leu Ile Ser
260 265 270
Asn Leu Ile Thr Lys Lys Ile Ser Ala Ile Lys Asp Ser Gly Glu Leu
275 280 285
Lys Ala Glu Ile Glu Lys Ala Lys Lys Cys Ser Glu Glu Phe Thr Ala
290 295 300
Lys Leu Lys Gly Glu His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp
305 310 315 320

Sub-A1

```
Asp Asn Ala Lys Lys Ala Ile Leu Lys Thr Asn Asn Asp Lys Thr Lys
            325                 330                 335
Gly Ala Asp Glu Leu Glu Lys Leu Phe Glu Ser Val Lys Asn Leu Ser
        340                 345                 350
Lys Ala Ala Lys Glu Met Leu Thr Asn Ser Val Lys Glu Leu Thr Ser
    355                 360                 365
```

<210> 41
<211> 1106
<212> DNA
<213> Artificial Sequence

<220>
<223> OspC Chimera

<221> CDS
<222> (1)...(1106)

<400> 41

```
atg gct tgt aat aat tca gga aaa gat ggg aat gca tct gca aat tct   48
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Ala Ser Ala Asn Ser
 1               5                  10                  15

gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa aaa   96
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
            20                  25                  30

att aca gaa tct aac gca gtt gtt ctg gcc gtg aaa gaa gtt gag acc   144
Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val Glu Thr
        35                  40                  45

tta ctt gca tct ata gat gaa ctt gct acc aaa gct att ggt aaa aaa   192
Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys
    50                  55                  60

ata ggc aat aat ggt tta gag gcc aat cag agt aaa aac aca tca ttg   240
Ile Gly Asn Asn Gly Leu Glu Ala Asn Gln Ser Lys Asn Thr Ser Leu
65                  70                  75                  80

tta tca gga gct tat gca ata tct gac cta ata gca gaa aaa tta aat   288
Leu Ser Gly Ala Tyr Ala Ile Ser Asp Leu Ile Ala Glu Lys Leu Asn
                85                  90                  95

gta ttg aaa aat gaa gaa tta aag gaa aag att gat aca gct aag caa   336
Val Leu Lys Asn Glu Glu Leu Lys Glu Lys Ile Asp Thr Ala Lys Gln
            100                 105                 110

tgt tct aca gaa ttt act aat aaa cta aaa agt gaa cat gca gtg ctt   384
Cys Ser Thr Glu Phe Thr Asn Lys Leu Lys Ser Glu His Ala Val Leu
        115                 120                 125

ggt ctg gac aat ctt act gat gat aat gca caa aga gct att tta aaa   432
Gly Leu Asp Asn Leu Thr Asp Asp Asn Ala Gln Arg Ala Ile Leu Lys
    130                 135                 140
```

```
aaa cat gca aat aaa gat aag ggt gct gca gaa ctt gaa aag tta ttt   480
Lys His Ala Asn Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe
145                 150                 155                 160

aaa gcg gta gaa aac tta tca aaa gca gct caa gac aca tta aaa aat   528
Lys Ala Val Glu Asn Leu Ser Lys Ala Ala Gln Asp Thr Leu Lys Asn
                165                 170                 175

gct gtt aaa gag ctt aca agt cct att gtc cat ggt aat aat tca gga   576
Ala Val Lys Glu Leu Thr Ser Pro Ile Val His Gly Asn Asn Ser Gly
            180                 185                 190

aaa gat ggg aat aca tct gca aat tct gct gat gag tct gtt aaa ggg   624
Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly
        195                 200                 205

cct aat ctt aca gaa ata agt aaa aaa att aca gaa tct aac gca gtt   672
Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val
    210                 215                 220

gtt ctg gct gtg aaa gaa att gaa act ttg ctt gca tct ata gat gaa   720
Val Leu Ala Val Lys Glu Ile Glu Thr Leu Leu Ala Ser Ile Asp Glu
225                 230                 235                 240

ctt gct act aaa gct att ggt aaa aaa ata caa caa aat ggt ggt tta   768
Leu Ala Thr Lys Ala Ile Gly Lys Lys Ile Gln Gln Asn Gly Gly Leu
                245                 250                 255

gct gtc gaa gcg ggg cat aat gga aca ttg tta gca ggt gct tat aca   816
Ala Val Glu Ala Gly His Asn Gly Thr Leu Leu Ala Gly Ala Tyr Thr
            260                 265                 270

ata tca aaa cta ata aca caa aaa tta gat gga ttg aaa aat tca gaa   864
Ile Ser Lys Leu Ile Thr Gln Lys Leu Asp Gly Leu Lys Asn Ser Glu
        275                 280                 285

aaa tta aag gaa aaa att gaa aat gct aag aaa tgt tct gaa gat ttt   912
Lys Leu Lys Glu Lys Ile Glu Asn Ala Lys Lys Cys Ser Glu Asp Phe
    290                 295                 300

act aaa aaa cta gaa gga gaa cat gcg caa ctt gga att gaa aat gtt   960
Thr Lys Lys Leu Glu Gly Glu His Ala Gln Leu Gly Ile Glu Asn Val
305                 310                 315                 320

act gat gag aat gca aaa aaa gct att tta ata aca gat gca gct aaa  1008
Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu Ile Thr Asp Ala Ala Lys
                325                 330                 335

gat aag ggc gct gca gag ctt gaa aag cta ttt aaa gca gta gaa aac  1056
Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn
            340                 345                 350

ttg gca aaa gca gct aaa gag atg ctt gct aat tca gtt aaa gag ctt  1104
Leu Ala Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu
        355                 360                 365

ac                                                              1106
```

<210> 42

<211> 367
<212> PRT
<213> Artificial Sequence

<220>
<223> OspC Chimera

<400> 42
Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Ala Ser Ala Asn Ser Ala
1 5 10 15
Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile
20 25 30
Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val Glu Thr Leu
35 40 45
Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys Ile
50 55 60
Gly Asn Asn Gly Leu Glu Ala Asn Gln Ser Lys Asn Thr Ser Leu Leu
65 70 75 80
Ser Gly Ala Tyr Ala Ile Ser Asp Leu Ile Ala Glu Lys Leu Asn Val
85 90 95
Leu Lys Asn Glu Glu Leu Lys Glu Lys Ile Asp Thr Ala Lys Gln Cys
100 105 110
Ser Thr Glu Phe Thr Asn Lys Leu Lys Ser Glu His Ala Val Leu Gly
115 120 125
Leu Asp Asn Leu Thr Asp Asp Asn Ala Gln Arg Ala Ile Leu Lys Lys
130 135 140
His Ala Asn Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe Lys
145 150 155 160
Ala Val Glu Asn Leu Ser Lys Ala Ala Gln Asp Thr Leu Lys Asn Ala
165 170 175
Val Lys Glu Leu Thr Ser Pro Ile Val His Gly Asn Asn Ser Gly Lys
180 185 190
Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro
195 200 205
Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val
210 215 220
Leu Ala Val Lys Glu Ile Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu
225 230 235 240
Ala Thr Lys Ala Ile Gly Lys Lys Ile Gln Gln Asn Gly Gly Leu Ala
245 250 255
Val Glu Ala Gly His Asn Gly Thr Leu Leu Ala Gly Ala Tyr Thr Ile
260 265 270
Ser Lys Leu Ile Thr Gln Lys Leu Asp Gly Leu Lys Asn Ser Glu Lys
275 280 285
Leu Lys Glu Lys Ile Glu Asn Ala Lys Lys Cys Ser Glu Asp Phe Thr
290 295 300
Lys Lys Leu Glu Gly Glu His Ala Gln Leu Gly Ile Glu Asn Val Thr
305 310 315 320
Asp Glu Asn Ala Lys Lys Ala Ile Leu Ile Thr Asp Ala Ala Lys Asp
325 330 335
Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu
340 345 350
Ala Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu
355 360 365

<210> 43
<211> 633
<212> DNA

Sub A1

<213> Borrelia burgdorferi

<220>
<221> CDS
<222> (1)...(633)

<400> 43

```
atg aaa aag aat aca tta agt gcg ata tta atg act tta ttt tta ttt   48
Met Lys Lys Asn Thr Leu Ser Ala Ile Leu Met Thr Leu Phe Leu Phe
 1               5                  10                  15

ata tct tgt aat aat tca ggg aaa gat ggg aat aca tct gca aat tct   96
Ile Ser Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
            20                  25                  30

gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata aat aaa aaa  144
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Asn Lys Lys
        35                  40                  45

att acg gat tct aat gcg gtt tta ctt gct gtg aaa gag gtt gaa gcg  192
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
    50                  55                  60

ttg ctg tca tct ata gat gaa att gct gct aaa gct att ggt aaa aaa  240
Leu Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys
65                  70                  75                  80

ata cac caa aat aat ggt ttg gat acc gaa aat aat cac aat gga tca  288
Ile His Gln Asn Asn Gly Leu Asp Thr Glu Asn Asn His Asn Gly Ser
                85                  90                  95

ttg tta gcg gga gct tat gca ata tca acc cta ata aaa caa aaa tta  336
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu
            100                 105                 110

gat gga ttg aaa aat gaa gga tta aag gaa aaa att gat gcg gct aag  384
Asp Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys
        115                 120                 125

aaa tgt tct gaa aca ttt act aat aaa tta aaa gaa aaa cac aca gat  432
Lys Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp
    130                 135                 140

ctt ggt aaa gaa ggt gtt act gat gct gat gca aaa gaa gcc att tta  480
Leu Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu
145                 150                 155                 160

aaa gca aat ggt act aaa act aaa ggt gct gaa gaa ctt gga aaa tta  528
Lys Ala Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu
                165                 170                 175

ttt gaa tca gta gag gtc ttg tca aaa gca gct aaa gag atg ctt gct  576
Phe Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala
            180                 185                 190

aat tca gtt aaa gag ctt aca agc cct gtt gtg gca gaa agt cca aaa  624
Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Lys
        195                 200                 205
```

Sub-A1

```
aaa cct taa                                                          633
Lys Pro  *
    210


<210> 44
<211> 209
<212> PRT
<213> Borrelia burgdorferi

<400> 44
Lys Lys Asn Thr Leu Ser Ala Ile Leu Met Thr Leu Phe Leu Phe Ile
 1               5                  10                  15
Ser Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala
            20                  25                  30
Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Asn Lys Lys Ile
        35                  40                  45
Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala Leu
    50                  55                  60
Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys Ile
65                  70                  75                  80
His Gln Asn Asn Gly Leu Asp Thr Glu Asn Asn His Asn Gly Ser Leu
                85                  90                  95
Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu Asp
            100                 105                 110
Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys Lys
        115                 120                 125
Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp Leu
    130                 135                 140
Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu Lys
145                 150                 155                 160
Ala Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu Phe
                165                 170                 175
Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala Asn
            180                 185                 190
Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Lys Lys
        195                 200                 205
Pro



<210> 45
<211> 580
<212> DNA
<213> Borrelia burgdorferi

<220>
<221> CDS
<222> (1)...(580)

<400> 45
atg gct tgt aat aat tca ggg aaa gat ggg aat aca tct gca aat tct    48
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
 1               5                  10                  15

gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata aat aaa aaa    96
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Asn Lys Lys
            20                  25                  30
```

```
att acg gat tct aat gcg gtt tta ctt gct gtg aaa gag gtt gaa gcg   144
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
          35                  40                  45

ttg ctg tca tct ata gat gaa att gct gct aaa gct att ggt aaa aaa   192
Leu Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys
     50                  55                  60

ata cac caa aat aat ggt ttg gat acc gaa aat aat cac aat gga tca   240
Ile His Gln Asn Asn Gly Leu Asp Thr Glu Asn Asn His Asn Gly Ser
 65                  70                  75                  80

ttg tta gcg gga gct tat gca ata tca acc cta ata aaa caa aaa tta   288
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu
                85                  90                  95

gat gga ttg aaa aat gaa gga tta aag gaa aaa att gat gcg gct aag   336
Asp Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys
            100                 105                 110

aaa tgt tct gaa aca ttt act aat aaa tta aaa gaa aaa cac aca gat   384
Lys Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp
        115                 120                 125

ctt ggt aaa gaa ggt gtt act gat gct gat gca aaa gaa gcc att tta   432
Leu Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu
    130                 135                 140

aaa gca aat ggt act aaa act aaa ggt gct gaa gaa ctt gga aaa tta   480
Lys Ala Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu
145                 150                 155                 160

ttt gaa tca gta gag gtc ttg tca aaa gca gct aaa gag atg ctt gct   528
Phe Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala
                165                 170                 175

aat tca gtt aaa gag ctt aca agc cct gtt gtg gca gaa agt cca tcc   576
Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Ser
            180                 185                 190

atg g                                                            580
Met
```

<210> 46
<211> 192
<212> PRT
<213> Borrelia burgdorferi

<400> 46

```
Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala
 1               5                  10                  15
Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Asn Lys Lys Ile
            20                  25                  30
Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala Leu
        35                  40                  45
Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys Ile
    50                  55                  60
```

```
His Gln Asn Asn Gly Leu Asp Thr Glu Asn Asn His Asn Gly Ser Leu
65                  70                  75                  80
Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu Asp
                85                  90                  95
Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys Lys
            100                 105                 110
Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp Leu
        115                 120                 125
Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu Lys
    130                 135                 140
Ala Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu Phe
145                 150                 155                 160
Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala Asn
                165                 170                 175
Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Ser Met
            180                 185                 190
```

<210> 47
<211> 639
<212> DNA
<213> Borrelia garinii

<220>
<221> CDS
<222> (1)...(639)

<400> 47

```
atg aaa aag aat aca tta agt gcg ata tta atg act tta ttt tta ttt   48
Met Lys Lys Asn Thr Leu Ser Ala Ile Leu Met Thr Leu Phe Leu Phe
 1               5                  10                  15

ata tct tgt agt aat tca ggg aaa ggt ggg gat tct gca tct act aat   96
Ile Ser Cys Ser Asn Ser Gly Lys Gly Gly Asp Ser Ala Ser Thr Asn
            20                  25                  30

cct gct gac gag tct gcg aaa ggg cct aat ctt aca gaa ata agc aaa   144
Pro Ala Asp Glu Ser Ala Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys
        35                  40                  45

aaa att aca gat tct aat gca ttt gta ctt gct gtt aaa gaa gtt gag   192
Lys Ile Thr Asp Ser Asn Ala Phe Val Leu Ala Val Lys Glu Val Glu
    50                  55                  60

act ttg gtt tta tct ata gat gaa ctt gct aag aaa gct att ggt caa   240
Thr Leu Val Leu Ser Ile Asp Glu Leu Ala Lys Lys Ala Ile Gly Gln
65                  70                  75                  80

aaa ata gac aat aat aat ggt tta gct gct tta aat aat cag aat gga   288
Lys Ile Asp Asn Asn Asn Gly Leu Ala Ala Leu Asn Asn Gln Asn Gly
                85                  90                  95

tcg ttg tta gca gga gcc tat gca ata tca acc cta ata aca gaa aaa   336
Ser Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Thr Glu Lys
            100                 105                 110

ttg agt aaa ttg aaa aat tta gaa gaa tta aag aca gaa att gca aag   384
Leu Ser Lys Leu Lys Asn Leu Glu Glu Leu Lys Thr Glu Ile Ala Lys
        115                 120                 125
```

```
gct aag aaa tgt tcc gaa gaa ttt act aat aaa cta aaa agt ggt cat   432
Ala Lys Lys Cys Ser Glu Glu Phe Thr Asn Lys Leu Lys Ser Gly His
    130                 135                 140

gca gat ctt ggc aaa cag gat gct acc gat gat cat gca aaa gca gct   480
Ala Asp Leu Gly Lys Gln Asp Ala Thr Asp Asp His Ala Lys Ala Ala
145                 150                 155                 160

att tta aaa aca cat gca act acc gat aaa ggt gct aaa gaa ttt aaa   528
Ile Leu Lys Thr His Ala Thr Thr Asp Lys Gly Ala Lys Glu Phe Lys
                165                 170                 175

gat tta ttt gaa tca gta gaa ggt ttg tta aaa gca gct caa gta gca   576
Asp Leu Phe Glu Ser Val Glu Gly Leu Leu Lys Ala Ala Gln Val Ala
            180                 185                 190

cta act aat tca gtt aaa gaa ctt aca agt cct gtt gta gca gaa agt   624
Leu Thr Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser
        195                 200                 205

cca aaa aaa cct taa                                              639
Pro Lys Lys Pro  *
    210
```

<210> 48
<211> 211
<212> PRT
<213> Borrelia garinii

<400> 48

```
Lys Lys Asn Thr Leu Ser Ala Ile Leu Met Thr Leu Phe Leu Phe Ile
 1               5                  10                  15
Ser Cys Ser Asn Ser Gly Lys Gly Gly Asp Ser Ala Ser Thr Asn Pro
            20                  25                  30
Ala Asp Glu Ser Ala Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
        35                  40                  45
Ile Thr Asp Ser Asn Ala Phe Val Leu Ala Val Lys Glu Val Glu Thr
    50                  55                  60
Leu Val Leu Ser Ile Asp Glu Leu Ala Lys Lys Ala Ile Gly Gln Lys
65                  70                  75                  80
Ile Asp Asn Asn Asn Gly Leu Ala Ala Leu Asn Asn Gln Asn Gly Ser
                85                  90                  95
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Thr Glu Lys Leu
            100                 105                 110
Ser Lys Leu Lys Asn Leu Glu Glu Leu Lys Thr Glu Ile Ala Lys Ala
        115                 120                 125
Lys Lys Cys Ser Glu Glu Phe Thr Asn Lys Leu Lys Ser Gly His Ala
    130                 135                 140
Asp Leu Gly Lys Gln Asp Ala Thr Asp Asp His Ala Lys Ala Ala Ile
145                 150                 155                 160
Leu Lys Thr His Ala Thr Thr Asp Lys Gly Ala Lys Glu Phe Lys Asp
                165                 170                 175
Leu Phe Glu Ser Val Glu Gly Leu Leu Lys Ala Ala Gln Val Ala Leu
            180                 185                 190
Thr Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro
        195                 200                 205
```

Sub A1

Lys Lys Pro
210

<210> 49
<211> 624
<212> DNA
<213> Borrelia afzelii

<220>
<221> CDS
<222> (1)...(624)

<400> 49

```
atg aaa aag aat aca tta agt gcg ata tta atg act tta ttt tta ttt   48
Met Lys Lys Asn Thr Leu Ser Ala Ile Leu Met Thr Leu Phe Leu Phe
 1               5                  10                  15

ata tct tgt aat aat tca ggt ggg gat tct gca tct act aat cct gat   96
Ile Ser Cys Asn Asn Ser Gly Gly Asp Ser Ala Ser Thr Asn Pro Asp
            20                  25                  30

gag tct gca aaa gga cct aat ctt acc gta ata agc aaa aaa att aca   144
Glu Ser Ala Lys Gly Pro Asn Leu Thr Val Ile Ser Lys Lys Ile Thr
        35                  40                  45

gat tct aat gca ttt tta ctg gct gtg aaa gaa gtt gag gct ttg ctt   192
Asp Ser Asn Ala Phe Leu Leu Ala Val Lys Glu Val Glu Ala Leu Leu
    50                  55                  60

tca tct ata gat gaa ctt tct aaa gct att ggt aaa aaa ata aaa aat   240
Ser Ser Ile Asp Glu Leu Ser Lys Ala Ile Gly Lys Lys Ile Lys Asn
65                  70                  75                  80

gat ggt act tta gat aac gaa gca aat cga aac gaa tca ttg ata gca   288
Asp Gly Thr Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser Leu Ile Ala
                85                  90                  95

gga gct tat gaa ata tca aaa cta ata aca caa aaa tta agt gta ttg   336
Gly Ala Tyr Glu Ile Ser Lys Leu Ile Thr Gln Lys Leu Ser Val Leu
            100                 105                 110

aat tca gaa gaa tta aag aaa aaa att aaa gag gct aag gat tgt tcc   384
Asn Ser Glu Glu Leu Lys Lys Lys Ile Lys Glu Ala Lys Asp Cys Ser
        115                 120                 125

caa aaa ttt act act aag cta aaa gat agt cat gca gag ctt ggt ata   432
Gln Lys Phe Thr Thr Lys Leu Lys Asp Ser His Ala Glu Leu Gly Ile
    130                 135                 140

caa agc gtt cag gat gat aat gca aaa aaa gct att tta aaa aca cat   480
Gln Ser Val Gln Asp Asp Asn Ala Lys Lys Ala Ile Leu Lys Thr His
145                 150                 155                 160

gga act aaa gac aag ggt gct aaa gaa ctt gaa gag tta ttt aaa tca   528
Gly Thr Lys Asp Lys Gly Ala Lys Glu Leu Glu Glu Leu Phe Lys Ser
                165                 170                 175
```

```
cta gaa agc ttg tca aaa gca gcg caa gca gca tta act aat tca gtt   576
Leu Glu Ser Leu Ser Lys Ala Ala Gln Ala Ala Leu Thr Asn Ser Val
            180                 185                 190

aaa gag ctt aca aat cct gtt gtg gca gaa agt cca aaa aaa cct taa   624
Lys Glu Leu Thr Asn Pro Val Val Ala Glu Ser Pro Lys Lys Pro  *
        195                 200                 205
```

<210> 50
<211> 206
<212> PRT
<213> Borrelia afzelii

<400> 50

```
Lys Lys Asn Thr Leu Ser Ala Ile Leu Met Thr Leu Phe Leu Phe Ile
 1               5                  10                  15
Ser Cys Asn Asn Ser Gly Gly Asp Ser Ala Ser Thr Asn Pro Asp Glu
            20                  25                  30
Ser Ala Lys Gly Pro Asn Leu Thr Val Ile Ser Lys Lys Ile Thr Asp
        35                  40                  45
Ser Asn Ala Phe Leu Leu Ala Val Lys Glu Val Glu Ala Leu Leu Ser
    50                  55                  60
Ser Ile Asp Glu Leu Ser Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp
65                  70                  75                  80
Gly Thr Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser Leu Ile Ala Gly
                85                  90                  95
Ala Tyr Glu Ile Ser Lys Leu Ile Thr Gln Lys Leu Ser Val Leu Asn
            100                 105                 110
Ser Glu Glu Leu Lys Lys Lys Ile Lys Glu Ala Lys Asp Cys Ser Gln
        115                 120                 125
Lys Phe Thr Thr Lys Leu Lys Asp Ser His Ala Glu Leu Gly Ile Gln
    130                 135                 140
Ser Val Gln Asp Asp Asn Ala Lys Lys Ala Ile Leu Lys Thr His Gly
145                 150                 155                 160
Thr Lys Asp Lys Gly Ala Lys Glu Leu Glu Glu Leu Phe Lys Ser Leu
                165                 170                 175
Glu Ser Leu Ser Lys Ala Ala Gln Ala Ala Leu Thr Asn Ser Val Lys
            180                 185                 190
Glu Leu Thr Asn Pro Val Val Ala Glu Ser Pro Lys Lys Pro
        195                 200                 205
```

<210> 51
<211> 1680
<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1680)

<400> 51

```
atg gct tgt aat aat tca ggg aaa gat ggg aat aca tct gca aat tct    48
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
 1               5                  10                  15
```

```
gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa aaa   96
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
            20                  25                  30

att acg gat tct aat gcg gtt tta ctt gct gtg aaa gag gtt gaa gcg   144
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
        35                  40                  45

ttg ctg tca tct ata gat gaa att gct gct aaa gct att ggt aaa aaa   192
Leu Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys
    50                  55                  60

ata cac caa aat aat ggt ttg gat acc gaa tat aat cac aat gga tca   240
Ile His Gln Asn Asn Gly Leu Asp Thr Glu Tyr Asn His Asn Gly Ser
65                  70                  75                  80

ttg tta gcg gga gct tat gca ata tca acc cta ata aaa caa aaa tta   288
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu
                85                  90                  95

gat gga ttg aaa aat gaa gga tta aag gaa aaa att gat gcg gct aag   336
Asp Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys
            100                 105                 110

aaa tgt tct gaa aca ttt act aat aaa tta aaa gaa aaa cac aca gat   384
Lys Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp
        115                 120                 125

ctt ggt aaa gaa ggt gtt act gat gct gat gca aaa gaa gcc att tta   432
Leu Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu
    130                 135                 140

aaa aca aat ggt act aaa act aaa ggt gct gaa gaa ctt gga aaa tta   480
Lys Thr Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu
145                 150                 155                 160

ttt gaa tca gta gag gtc ttg tca aaa gca gct aaa gag atg ctt gct   528
Phe Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala
                165                 170                 175

aat tca gtt aaa gag ctt aca agc cct gtt gtg gca gaa agt cca gcc   576
Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Ala
            180                 185                 190

atg ggt agt aat tca ggg aaa ggt ggg gat tct gca tct act aat cct   624
Met Gly Ser Asn Ser Gly Lys Gly Gly Asp Ser Ala Ser Thr Asn Pro
        195                 200                 205

gct gac gag tct gcg aaa ggg cct aat ctt aca gaa ata agc aaa aaa   672
Ala Asp Glu Ser Ala Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
    210                 215                 220

att aca gat tct aat gca ttt gta ctt gct gtt aaa gaa gtt gag act   720
Ile Thr Asp Ser Asn Ala Phe Val Leu Ala Val Lys Glu Val Glu Thr
225                 230                 235                 240

ttg gtt tta tct ata gat gaa ctt gct aag aaa gct att ggt caa aaa   768
Leu Val Leu Ser Ile Asp Glu Leu Ala Lys Lys Ala Ile Gly Gln Lys
                245                 250                 255
```

```
ata gac aat aat aat ggt tta gct gct tta aat aat cag aat gga tcg   816
Ile Asp Asn Asn Asn Gly Leu Ala Ala Leu Asn Asn Gln Asn Gly Ser
            260                 265                 270

ttg tta gca gga gcc tat gca ata tca acc cta ata aca gaa aaa ttg   864
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Thr Glu Lys Leu
        275                 280                 285

agt aaa ttg aaa aat tta gaa gaa tta aag aca gaa att gca aag gct   912
Ser Lys Leu Lys Asn Leu Glu Glu Leu Lys Thr Glu Ile Ala Lys Ala
    290                 295                 300

aag aaa tgt tcc gaa gaa ttt act aat aaa cta aaa agt ggt cat gca   960
Lys Lys Cys Ser Glu Glu Phe Thr Asn Lys Leu Lys Ser Gly His Ala
305                 310                 315                 320

gat ctt ggc aaa cag gat gct acc gat gat cat gca aaa gca gct att  1008
Asp Leu Gly Lys Gln Asp Ala Thr Asp Asp His Ala Lys Ala Ala Ile
                325                 330                 335

tta aaa aca cat gca act acc gat aaa ggt gct aaa gaa ttt aaa gat  1056
Leu Lys Thr His Ala Thr Thr Asp Lys Gly Ala Lys Glu Phe Lys Asp
            340                 345                 350

tta ttt gaa tca gta gaa ggt ttg tta aaa gca gct caa gta gca cta  1104
Leu Phe Glu Ser Val Glu Gly Leu Leu Lys Ala Ala Gln Val Ala Leu
        355                 360                 365

act aat tca gtt aaa gaa ctt ggt cac cgt aat aat tca ggt ggg gat  1152
Thr Asn Ser Val Lys Glu Leu Gly His Arg Asn Asn Ser Gly Gly Asp
    370                 375                 380

tct gca tct act aat cct gat gag tct gca aaa gga cct aat ctt acc  1200
Ser Ala Ser Thr Asn Pro Asp Glu Ser Ala Lys Gly Pro Asn Leu Thr
385                 390                 395                 400

gta ata agc aaa aaa att aca gat tct aat gca ttt tta ctg gct gtg  1248
Val Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Phe Leu Leu Ala Val
                405                 410                 415

aaa gaa gtt gag gct ttg ctt tca tct ata gat gaa ctt tct aaa gct  1296
Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Leu Ser Lys Ala
            420                 425                 430

att ggt aaa aaa ata aaa aat gat ggt act tta gat aac gaa gca aat  1344
Ile Gly Lys Lys Ile Lys Asn Asp Gly Thr Leu Asp Asn Glu Ala Asn
        435                 440                 445

cga aac gaa tca ttg ata gca gga gct tat gaa ata tca aaa cta ata  1392
Arg Asn Glu Ser Leu Ile Ala Gly Ala Tyr Glu Ile Ser Lys Leu Ile
    450                 455                 460

aca caa aaa tta agt gta ttg aat tca gaa gaa tta aag aaa aaa att  1440
Thr Gln Lys Leu Ser Val Leu Asn Ser Glu Glu Leu Lys Lys Lys Ile
465                 470                 475                 480
```

```
aaa gag gct aag gat tgt tcc caa aaa ttt act act aag cta aaa gat   1488
Lys Glu Ala Lys Asp Cys Ser Gln Lys Phe Thr Thr Lys Leu Lys Asp
                485                 490                 495

agt cat gca gag ctt ggt ata caa agc gtt cag gat gat aat gca aaa   1536
Ser His Ala Glu Leu Gly Ile Gln Ser Val Gln Asp Asp Asn Ala Lys
            500                 505                 510

aaa gct att tta aaa aca cat gga act aaa gac aag ggt gct aaa gaa   1584
Lys Ala Ile Leu Lys Thr His Gly Thr Lys Asp Lys Gly Ala Lys Glu
        515                 520                 525

ctt gaa gag tta ttt aaa tca cta gaa agc ttg tca aaa gca gcg caa   1632
Leu Glu Glu Leu Phe Lys Ser Leu Glu Ser Leu Ser Lys Ala Ala Gln
    530                 535                 540

gca gca tta act aat tca gtt aaa gag ctt aca aat cct gtt gtg gca   1680
Ala Ala Leu Thr Asn Ser Val Lys Glu Leu Thr Asn Pro Val Val Ala
545                 550                 555                 560
```

<210> 52
<211> 560
<212> PRT
<213> ospC Chimera

<400> 52

```
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
 1               5                  10                  15
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
            20                  25                  30
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
        35                  40                  45
Leu Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys
    50                  55                  60
Ile His Gln Asn Asn Gly Leu Asp Thr Glu Tyr Asn His Asn Gly Ser
65                  70                  75                  80
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu
                85                  90                  95
Asp Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys
            100                 105                 110
Lys Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp
        115                 120                 125
Leu Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu
    130                 135                 140
Lys Thr Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu
145                 150                 155                 160
Phe Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala
                165                 170                 175
Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Ala
            180                 185                 190
Met Gly Ser Asn Ser Gly Lys Gly Gly Asp Ser Ala Ser Thr Asn Pro
        195                 200                 205
Ala Asp Glu Ser Ala Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
    210                 215                 220
Ile Thr Asp Ser Asn Ala Phe Val Leu Ala Val Lys Glu Val Glu Thr
225                 230                 235                 240
```

```
Leu Val Leu Ser Ile Asp Glu Leu Ala Lys Lys Ala Ile Gly Gln Lys
                245                 250                 255
Ile Asp Asn Asn Asn Gly Leu Ala Ala Leu Asn Asn Gln Asn Gly Ser
            260                 265                 270
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Thr Glu Lys Leu
        275                 280                 285
Ser Lys Leu Lys Asn Leu Glu Glu Leu Lys Thr Glu Ile Ala Lys Ala
    290                 295                 300
Lys Lys Cys Ser Glu Glu Phe Thr Asn Lys Leu Lys Ser Gly His Ala
305                 310                 315                 320
Asp Leu Gly Lys Gln Asp Ala Thr Asp Asp His Ala Lys Ala Ala Ile
                325                 330                 335
Leu Lys Thr His Ala Thr Thr Asp Lys Gly Ala Lys Glu Phe Lys Asp
            340                 345                 350
Leu Phe Glu Ser Val Glu Gly Leu Leu Lys Ala Ala Gln Val Ala Leu
        355                 360                 365
Thr Asn Ser Val Lys Glu Leu Gly His Arg Asn Asn Ser Gly Gly Asp
    370                 375                 380
Ser Ala Ser Thr Asn Pro Asp Glu Ser Ala Lys Gly Pro Asn Leu Thr
385                 390                 395                 400
Val Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Phe Leu Leu Ala Val
                405                 410                 415
Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Leu Ser Lys Ala
            420                 425                 430
Ile Gly Lys Lys Ile Lys Asn Asp Gly Thr Leu Asp Asn Glu Ala Asn
        435                 440                 445
Arg Asn Glu Ser Leu Ile Ala Gly Ala Tyr Glu Ile Ser Lys Leu Ile
    450                 455                 460
Thr Gln Lys Leu Ser Val Leu Asn Ser Glu Glu Leu Lys Lys Lys Ile
465                 470                 475                 480
Lys Glu Ala Lys Asp Cys Ser Gln Lys Phe Thr Thr Lys Leu Lys Asp
                485                 490                 495
Ser His Ala Glu Leu Gly Ile Gln Ser Val Gln Asp Asp Asn Ala Lys
            500                 505                 510
Lys Ala Ile Leu Lys Thr His Gly Thr Lys Asp Lys Gly Ala Lys Glu
        515                 520                 525
Leu Glu Glu Leu Phe Lys Ser Leu Glu Ser Leu Ser Lys Ala Ala Gln
    530                 535                 540
Ala Ala Leu Thr Asn Ser Val Lys Glu Leu Thr Asn Pro Val Val Ala
545                 550                 555                 560


<210> 53
<211> 1137
<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1137)

<400> 53
atg gct tgt aat aat tca ggg aaa gat ggg aat aca tct gca aat tct    48
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
 1               5                  10                  15

gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa aaa    96
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
            20                  25                  30
```

SubA1

```
att acg gat tct aat gcg gtt tta ctt gct gtg aaa gag gtt gaa gcg    144
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
         35                  40                  45

ttg ctg tca tct ata gat gag ctt gct aaa gct att ggt aaa aaa ata    192
Leu Leu Ser Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys Lys Ile
     50                  55                  60

aaa aac gat ggt agt tta gat aat gaa gca aat cgc aac gag tca ttg    240
Lys Asn Asp Gly Ser Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser Leu
 65                  70                  75                  80

tta gca gga gct tat aca ata tca acc tta ata aca caa aaa tta agt    288
Leu Ala Gly Ala Tyr Thr Ile Ser Thr Leu Ile Thr Gln Lys Leu Ser
                 85                  90                  95

aaa tta aac gga tca gaa ggt tta aag gaa aag att gcc gca gct aag    336
Lys Leu Asn Gly Ser Glu Gly Leu Lys Glu Lys Ile Ala Ala Ala Lys
            100                 105                 110

aaa tgc tct gaa gag ttt agt act aaa cta aaa gat aat cat gca cag    384
Lys Cys Ser Glu Glu Phe Ser Thr Lys Leu Lys Asp Asn His Ala Gln
        115                 120                 125

ctt ggt ata cag ggc gtt act gat gaa aat gca aaa aaa gct att tta    432
Leu Gly Ile Gln Gly Val Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu
    130                 135                 140

aaa gca aat gca gcg ggt aaa gat aag ggc gtt gaa gaa ctt gaa aag    480
Lys Ala Asn Ala Ala Gly Lys Asp Lys Gly Val Glu Glu Leu Glu Lys
145                 150                 155                 160

ttg tcc gga tca tta gaa agc tta tca aaa gca gct aaa gag atg ctt    528
Leu Ser Gly Ser Leu Glu Ser Leu Ser Lys Ala Ala Lys Glu Met Leu
                165                 170                 175

gct aat tca gtt aaa gag ctt aca agc cct gtt gtc cat ggt aat aat    576
Ala Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val His Gly Asn Asn
            180                 185                 190

tca ggt ggg gat tct gca tct act aat cct gat gag tct gca aaa gga    624
Ser Gly Gly Asp Ser Ala Ser Thr Asn Pro Asp Glu Ser Ala Lys Gly
        195                 200                 205

cct aat ctt acc gta ata agc aaa aaa att aca gat tct aat gca ttt    672
Pro Asn Leu Thr Val Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Phe
    210                 215                 220

tta ctg gct gtg aaa gaa gtt gag gct ttg ctt tca tct ata gat gaa    720
Leu Leu Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu
225                 230                 235                 240

ctt tct aaa gct att ggt aaa aaa ata aaa aat gat ggt act tta gat    768
Leu Ser Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Gly Thr Leu Asp
                245                 250                 255
```

```
aac gaa gca aat cga aac gaa tca ttg ata gca gga gct tat gaa ata   816
Asn Glu Ala Asn Arg Asn Glu Ser Leu Ile Ala Gly Ala Tyr Glu Ile
            260                 265                 270

tca aaa cta ata aca caa aaa tta agt gta ttg aat tca gaa gaa tta   864
Ser Lys Leu Ile Thr Gln Lys Leu Ser Val Leu Asn Ser Glu Glu Leu
        275                 280                 285

aag aaa aaa att aaa gag gct aag gat tgt tcc caa aaa ttt act act   912
Lys Lys Lys Ile Lys Glu Ala Lys Asp Cys Ser Gln Lys Phe Thr Thr
    290                 295                 300

aag cta aaa gat agt cat gca gag ctt ggt ata caa agc gtt cag gat   960
Lys Leu Lys Asp Ser His Ala Glu Leu Gly Ile Gln Ser Val Gln Asp
305                 310                 315                 320

gat aat gca aaa aaa gct att tta aaa aca cat gga act aaa gac aag   1008
Asp Asn Ala Lys Lys Ala Ile Leu Lys Thr His Gly Thr Lys Asp Lys
                325                 330                 335

ggt gct aaa gaa ctt gaa gag tta ttt aaa tca cta gaa agc ttg tca   1056
Gly Ala Lys Glu Leu Glu Glu Leu Phe Lys Ser Leu Glu Ser Leu Ser
            340                 345                 350

aaa gca gcg caa gca gca tta act aat tca gtt aaa gag ctt aca aat   1104
Lys Ala Ala Gln Ala Ala Leu Thr Asn Ser Val Lys Glu Leu Thr Asn
        355                 360                 365

cct gtt gtg gca gaa agt cca aaa aaa cct taa                      1137
Pro Val Val Ala Glu Ser Pro Lys Lys Pro  *
    370                 375
```

<210> 54
<211> 378
<212> PRT
<213> ospC Chimera

<400> 54

```
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
 1               5                  10                  15
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
            20                  25                  30
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
        35                  40                  45
Leu Leu Ser Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys Lys Ile
    50                  55                  60
Lys Asn Asp Gly Ser Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser Leu
65                  70                  75                  80
Leu Ala Gly Ala Tyr Thr Ile Ser Thr Leu Ile Thr Gln Lys Leu Ser
                85                  90                  95
Lys Leu Asn Gly Ser Glu Gly Leu Lys Glu Lys Ile Ala Ala Ala Lys
            100                 105                 110
Lys Cys Ser Glu Glu Phe Ser Thr Lys Leu Lys Asp Asn His Ala Gln
        115                 120                 125
Leu Gly Ile Gln Gly Val Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu
    130                 135                 140
Lys Ala Asn Ala Ala Gly Lys Asp Lys Gly Val Glu Glu Leu Glu Lys
145                 150                 155                 160
```

```
Leu Ser Gly Ser Leu Glu Ser Leu Ser Lys Ala Ala Lys Glu Met Leu
                165                 170                 175
Ala Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val His Gly Asn Asn
            180                 185                 190
Ser Gly Gly Asp Ser Ala Ser Thr Asn Pro Asp Glu Ser Ala Lys Gly
        195                 200                 205
Pro Asn Leu Thr Val Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Phe
    210                 215                 220
Leu Leu Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu
225                 230                 235                 240
Leu Ser Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Gly Thr Leu Asp
                245                 250                 255
Asn Glu Ala Asn Arg Asn Glu Ser Leu Ile Ala Gly Ala Tyr Glu Ile
            260                 265                 270
Ser Lys Leu Ile Thr Gln Lys Leu Ser Val Leu Asn Ser Glu Glu Leu
        275                 280                 285
Lys Lys Lys Ile Lys Glu Ala Lys Asp Cys Ser Gln Lys Phe Thr Thr
    290                 295                 300
Lys Leu Lys Asp Ser His Ala Glu Leu Gly Ile Gln Ser Val Gln Asp
305                 310                 315                 320
Asp Asn Ala Lys Lys Ala Ile Leu Lys Thr His Gly Thr Lys Asp Lys
                325                 330                 335
Gly Ala Lys Glu Leu Glu Glu Leu Phe Lys Ser Leu Glu Ser Leu Ser
            340                 345                 350
Lys Ala Ala Gln Ala Ala Leu Thr Asn Ser Val Lys Glu Leu Thr Asn
        355                 360                 365
Pro Val Val Ala Glu Ser Pro Lys Lys Pro
    370                 375
```

<210> 55
<211> 1158
<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1158)

<400> 55

```
atg gct tgt aat aat tca ggg aaa gat ggg aat aca tct gca aat tct    48
Met Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
 1               5                  10                  15

gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa aaa    96
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
            20                  25                  30

att acg gat tct aat gcg gtt tta ctt gct gtg aaa gag gtt gaa gcg   144
Ile Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala
        35                  40                  45

ttg ctg tca tct ata gat gaa att gct gct aaa gct att ggt aaa aaa   192
Leu Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys
    50                  55                  60

ata cac caa aat aat ggt ttg gat acc gaa tat aat cac aat gga tca   240
Ile His Gln Asn Asn Gly Leu Asp Thr Glu Tyr Asn His Asn Gly Ser
65                  70                  75                  80
```

```
ttg tta gcg gga gct tat gca ata tca acc cta ata aaa caa aaa tta   288
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu
                85                  90                  95

gat gga ttg aaa aat gaa gga tta aag gaa aaa att gat gcg gct aag   336
Asp Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys
            100                 105                 110

aaa tgt tct gaa aca ttt act aat aaa tta aaa gaa aaa cac aca gat   384
Lys Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp
        115                 120                 125

ctt ggt aaa gaa ggt gtt act gat gct gat gca aaa gaa gcc att tta   432
Leu Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu
    130                 135                 140

aaa aca aat ggt act aaa act aaa ggt gct gaa gaa ctt gga aaa tta   480
Lys Thr Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu
145                 150                 155                 160

ttt gaa tca gta gag gtc ttg tca aaa gca gct aaa gag atg ctt gct   528
Phe Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala
                165                 170                 175

aat tca gtt aaa gag ctt aca agc cct gtt gtg gca gaa agt cca aaa   576
Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Lys
            180                 185                 190

aaa cct ttc cat ggt aat aat tca ggt ggg gat tct gca tct act aat   624
Lys Pro Phe His Gly Asn Asn Ser Gly Gly Asp Ser Ala Ser Thr Asn
        195                 200                 205

cct gat gag tct gca aaa gga cct aat ctt acc gta ata agc aaa aaa   672
Pro Asp Glu Ser Ala Lys Gly Pro Asn Leu Thr Val Ile Ser Lys Lys
    210                 215                 220

att aca gat tct aat gca ttt tta ctg gct gtg aaa gaa gtt gag gct   720
Ile Thr Asp Ser Asn Ala Phe Leu Leu Ala Val Lys Glu Val Glu Ala
225                 230                 235                 240

ttg ctt tca tct ata gat gaa ctt tct aaa gct att ggt aaa aaa ata   768
Leu Leu Ser Ser Ile Asp Glu Leu Ser Lys Ala Ile Gly Lys Lys Ile
                245                 250                 255

aaa aat gat ggt act tta gat aac gaa gca aat cga aac gaa tca ttg   816
Lys Asn Asp Gly Thr Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser Leu
            260                 265                 270

ata gca gga gct tat gaa ata tca aaa cta ata aca caa aaa tta agt   864
Ile Ala Gly Ala Tyr Glu Ile Ser Lys Leu Ile Thr Gln Lys Leu Ser
        275                 280                 285

gta ttg aat tca gaa gaa tta aag aaa aaa att aaa gag gct aag gat   912
Val Leu Asn Ser Glu Glu Leu Lys Lys Lys Ile Lys Glu Ala Lys Asp
    290                 295                 300
```

```
tgt tcc caa aaa ttt act act aag cta aaa gat agt cat gca gag ctt   960
Cys Ser Gln Lys Phe Thr Thr Lys Leu Lys Asp Ser His Ala Glu Leu
305                 310                 315                 320

ggt ata caa agc gtt cag gat gat aat gca aaa aaa gct att tta aaa   1008
Gly Ile Gln Ser Val Gln Asp Asp Asn Ala Lys Lys Ala Ile Leu Lys
                325                 330                 335

aca cat gga act aaa gac aag ggt gct aaa gaa ctt gaa gag tta ttt   1056
Thr His Gly Thr Lys Asp Lys Gly Ala Lys Glu Leu Glu Glu Leu Phe
            340                 345                 350

aaa tca cta gaa agc ttg tca aaa gca gcg caa gca gca tta act aat   1104
Lys Ser Leu Glu Ser Leu Ser Lys Ala Ala Gln Ala Ala Leu Thr Asn
        355                 360                 365

tca gtt aaa gag ctt aca aat cct gtt gtg gca gaa agt cca aaa aaa   1152
Ser Val Lys Glu Leu Thr Asn Pro Val Val Ala Glu Ser Pro Lys Lys
    370                 375                 380

cct taa                                                         1158
Pro  *
385
```

<210> 56
<211> 384
<212> PRT
<213> ospC Chimera

<400> 56

```
Ala Cys Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala
 1               5                  10                  15
Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile
            20                  25                  30
Thr Asp Ser Asn Ala Val Leu Leu Ala Val Lys Glu Val Glu Ala Leu
        35                  40                  45
Leu Ser Ser Ile Asp Glu Ile Ala Ala Lys Ala Ile Gly Lys Lys Ile
    50                  55                  60
His Gln Asn Asn Gly Leu Asp Thr Glu Tyr Asn His Asn Gly Ser Leu
65                  70                  75                  80
Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Lys Gln Lys Leu Asp
                85                  90                  95
Gly Leu Lys Asn Glu Gly Leu Lys Glu Lys Ile Asp Ala Ala Lys Lys
            100                 105                 110
Cys Ser Glu Thr Phe Thr Asn Lys Leu Lys Glu Lys His Thr Asp Leu
        115                 120                 125
Gly Lys Glu Gly Val Thr Asp Ala Asp Ala Lys Glu Ala Ile Leu Lys
    130                 135                 140
Thr Asn Gly Thr Lys Thr Lys Gly Ala Glu Glu Leu Gly Lys Leu Phe
145                 150                 155                 160
Glu Ser Val Glu Val Leu Ser Lys Ala Ala Lys Glu Met Leu Ala Asn
                165                 170                 175
Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro Lys Lys
            180                 185                 190
Pro Phe His Gly Asn Asn Ser Gly Gly Asp Ser Ala Ser Thr Asn Pro
        195                 200                 205
Asp Glu Ser Ala Lys Gly Pro Asn Leu Thr Val Ile Ser Lys Lys Ile
    210                 215                 220
```

Sub A1

```
Thr Asp Ser Asn Ala Phe Leu Leu Ala Val Lys Glu Val Glu Ala Leu
225                 230                 235                 240
Leu Ser Ser Ile Asp Glu Leu Ser Lys Ala Ile Gly Lys Lys Ile Lys
                245                 250                 255
Asn Asp Gly Thr Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser Leu Ile
            260                 265                 270
Ala Gly Ala Tyr Glu Ile Ser Lys Leu Ile Thr Gln Lys Leu Ser Val
        275                 280                 285
Leu Asn Ser Glu Glu Leu Lys Lys Lys Ile Lys Glu Ala Lys Asp Cys
    290                 295                 300
Ser Gln Lys Phe Thr Thr Lys Leu Lys Asp Ser His Ala Glu Leu Gly
305                 310                 315                 320
Ile Gln Ser Val Gln Asp Asp Asn Ala Lys Lys Ala Ile Leu Lys Thr
                325                 330                 335
His Gly Thr Lys Asp Lys Gly Ala Lys Glu Leu Glu Glu Leu Phe Lys
            340                 345                 350
Ser Leu Glu Ser Leu Ser Lys Ala Ala Gln Ala Ala Leu Thr Asn Ser
        355                 360                 365
Val Lys Glu Leu Thr Asn Pro Val Val Ala Glu Ser Pro Lys Lys Pro
    370                 375                 380
```

<210> 57
<211> 1161
<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1161)

<400> 57

```
atg tgt agt aat tca ggg aaa ggt ggg gat tct gca tct act aat cct   48
Met Cys Ser Asn Ser Gly Lys Gly Gly Asp Ser Ala Ser Thr Asn Pro
 1               5                  10                  15

gct gac gag tct gcg aaa ggg cct aat ctt aca gaa ata agc aaa aaa   96
Ala Asp Glu Ser Ala Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
            20                  25                  30

att aca gat tct aat gca ttt gta ctt gct gtt aaa gaa gtt gag act   144
Ile Thr Asp Ser Asn Ala Phe Val Leu Ala Val Lys Glu Val Glu Thr
        35                  40                  45

ttg gtt tta tct ata gat gaa ctt gct aag aaa gct att ggt caa aaa   192
Leu Val Leu Ser Ile Asp Glu Leu Ala Lys Lys Ala Ile Gly Gln Lys
    50                  55                  60

ata gac aat aat aat ggt tta gct gct tta aat aat cag aat gga tcg   240
Ile Asp Asn Asn Asn Gly Leu Ala Ala Leu Asn Asn Gln Asn Gly Ser
65                  70                  75                  80

ttg tta gca gga gcc tat gca ata tca acc cta ata aca gaa aaa ttg   288
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Thr Glu Lys Leu
                85                  90                  95

agt aaa ttg aaa aat tta gaa gaa tta aag aca gaa att gca aag gct   336
Ser Lys Leu Lys Asn Leu Glu Glu Leu Lys Thr Glu Ile Ala Lys Ala
            100                 105                 110
```

Sub A1

```
aag aaa tgt tcc gaa gaa ttt act aat aaa cta aaa agt ggt cat gca   384
Lys Lys Cys Ser Glu Glu Phe Thr Asn Lys Leu Lys Ser Gly His Ala
        115                 120                 125

gat ctt ggc aaa cag gat gct acc gat gat cat gca aaa gca gct att   432
Asp Leu Gly Lys Gln Asp Ala Thr Asp Asp His Ala Lys Ala Ala Ile
    130                 135                 140

tta aaa aca cat gca act acc gat aaa ggt gct aaa gaa ttt aaa gat   480
Leu Lys Thr His Ala Thr Thr Asp Lys Gly Ala Lys Glu Phe Lys Asp
145                 150                 155                 160

tta ttt gaa tca gta gaa ggt ttg tta aaa gca gct caa gta gca cta   528
Leu Phe Glu Ser Val Glu Gly Leu Leu Lys Ala Ala Gln Val Ala Leu
                165                 170                 175

act aat tca gtt aaa gaa ctt aca agt cct gtt gta gca gaa agt cca   576
Thr Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro
            180                 185                 190

aaa aaa cct cat atg gct aat aat tca ggt ggg gat tct gca tct act   624
Lys Lys Pro His Met Ala Asn Asn Ser Gly Gly Asp Ser Ala Ser Thr
        195                 200                 205

aat cct gat gag tct gca aaa gga cct aat ctt acc gta ata agc aaa   672
Asn Pro Asp Glu Ser Ala Lys Gly Pro Asn Leu Thr Val Ile Ser Lys
    210                 215                 220

aaa att aca gat tct aat gca ttt tta ctg gct gtg aaa gaa gtt gag   720
Lys Ile Thr Asp Ser Asn Ala Phe Leu Leu Ala Val Lys Glu Val Glu
225                 230                 235                 240

gct ttg ctt tca tct ata gat gaa ctt tct aaa gct att ggt aaa aaa   768
Ala Leu Leu Ser Ser Ile Asp Glu Leu Ser Lys Ala Ile Gly Lys Lys
                245                 250                 255

ata aaa aat gat ggt act tta gat aac gaa gca aat cga aac gaa tca   816
Ile Lys Asn Asp Gly Thr Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser
            260                 265                 270

ttg ata gca gga gct tat gaa ata tca aaa cta ata aca caa aaa tta   864
Leu Ile Ala Gly Ala Tyr Glu Ile Ser Lys Leu Ile Thr Gln Lys Leu
        275                 280                 285

agt gta ttg aat tca gaa gaa tta aag aaa aaa att aaa gag gct aag   912
Ser Val Leu Asn Ser Glu Glu Leu Lys Lys Lys Ile Lys Glu Ala Lys
    290                 295                 300

gat tgt tcc caa aaa ttt act act aag cta aaa gat agt cat gca gag   960
Asp Cys Ser Gln Lys Phe Thr Thr Lys Leu Lys Asp Ser His Ala Glu
305                 310                 315                 320

ctt ggt ata caa agc gtt cag gat gat aat gca aaa aaa gct att tta  1008
Leu Gly Ile Gln Ser Val Gln Asp Asp Asn Ala Lys Lys Ala Ile Leu
                325                 330                 335
```

```
aaa aca cat gga act aaa gac aag ggt gct aaa gaa ctt gaa gag tta   1056
Lys Thr His Gly Thr Lys Asp Lys Gly Ala Lys Glu Leu Glu Glu Leu
            340                 345                 350

ttt aaa tca cta gaa agc ttg tca aaa gca gcg caa gca gca tta act   1104
Phe Lys Ser Leu Glu Ser Leu Ser Lys Ala Ala Gln Ala Ala Leu Thr
        355                 360                 365

aat tca gtt aaa gag ctt aca aat cct gtt gtg gca gaa agt cca aaa   1152
Asn Ser Val Lys Glu Leu Thr Asn Pro Val Val Ala Glu Ser Pro Lys
    370                 375                 380

aaa cct taa                                                     1161
Lys Pro  *
385
```

<210> 58
<211> 386
<212> PRT
<213> ospC Chimera

<400> 58

```
Met Cys Ser Asn Ser Gly Lys Gly Gly Asp Ser Ala Ser Thr Asn Pro
 1               5                  10                  15
Ala Asp Glu Ser Ala Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
            20                  25                  30
Ile Thr Asp Ser Asn Ala Phe Val Leu Ala Val Lys Glu Val Glu Thr
        35                  40                  45
Leu Val Leu Ser Ile Asp Glu Leu Ala Lys Lys Ala Ile Gly Gln Lys
    50                  55                  60
Ile Asp Asn Asn Asn Gly Leu Ala Ala Leu Asn Asn Gln Asn Gly Ser
65                  70                  75                  80
Leu Leu Ala Gly Ala Tyr Ala Ile Ser Thr Leu Ile Thr Glu Lys Leu
                85                  90                  95
Ser Lys Leu Lys Asn Leu Glu Glu Leu Lys Thr Glu Ile Ala Lys Ala
            100                 105                 110
Lys Lys Cys Ser Glu Glu Phe Thr Asn Lys Leu Lys Ser Gly His Ala
        115                 120                 125
Asp Leu Gly Lys Gln Asp Ala Thr Asp Asp His Ala Lys Ala Ala Ile
    130                 135                 140
Leu Lys Thr His Ala Thr Thr Asp Lys Gly Ala Lys Glu Phe Lys Asp
145                 150                 155                 160
Leu Phe Glu Ser Val Glu Gly Leu Leu Lys Ala Ala Gln Val Ala Leu
                165                 170                 175
Thr Asn Ser Val Lys Glu Leu Thr Ser Pro Val Val Ala Glu Ser Pro
            180                 185                 190
Lys Lys Pro His Met Ala Asn Asn Ser Gly Gly Asp Ser Ala Ser Thr
        195                 200                 205
Asn Pro Asp Glu Ser Ala Lys Gly Pro Asn Leu Thr Val Ile Ser Lys
    210                 215                 220
Lys Ile Thr Asp Ser Asn Ala Phe Leu Leu Ala Val Lys Glu Val Glu
225                 230                 235                 240
Ala Leu Leu Ser Ser Ile Asp Glu Leu Ser Lys Ala Ile Gly Lys Lys
                245                 250                 255
Ile Lys Asn Asp Gly Thr Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser
            260                 265                 270
Leu Ile Ala Gly Ala Tyr Glu Ile Ser Lys Leu Ile Thr Gln Lys Leu
        275                 280                 285
```

Sub A1

```
Ser Val Leu Asn Ser Glu Glu Leu Lys Lys Lys Ile Lys Glu Ala Lys
    290                 295                 300
Asp Cys Ser Gln Lys Phe Thr Thr Lys Leu Lys Asp Ser His Ala Glu
305                 310                 315                 320
Leu Gly Ile Gln Ser Val Gln Asp Asp Asn Ala Lys Lys Ala Ile Leu
                325                 330                 335
Lys Thr His Gly Thr Lys Asp Lys Gly Ala Lys Glu Leu Glu Glu Leu
            340                 345                 350
Phe Lys Ser Leu Glu Ser Leu Ser Lys Ala Ala Gln Ala Ala Leu Thr
        355                 360                 365
Asn Ser Val Lys Glu Leu Thr Asn Pro Val Val Ala Glu Ser Pro Lys
    370                 375                 380
Lys Pro
385
```

<210> 59
<211> 1197
<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1197)

<400> 59

```
atg aga tta tta ata gga ttt gct tta gcg tta gct tta ata gga tgt   48
Met Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys
 1               5                  10                  15

gca caa aaa ggt gct gag tca att gga tcc tgt aat aat tca ggg aaa   96
Ala Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys
            20                  25                  30

gat ggg aat aca tct gca aat tct gct gat gag tct gtt aaa ggg cct   144
Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro
        35                  40                  45

aat ctt aca gaa ata agt aaa aaa att acg gat tct aat gcg gtt tta   192
Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu
    50                  55                  60

ctt gct gtg aaa gag gtt gaa gcg ttg ctg tca tct ata gat gaa att   240
Leu Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Ile
65                  70                  75                  80

gct gct aaa gct att ggt aaa aaa ata cac caa aat aat ggt ttg gat   288
Ala Ala Lys Ala Ile Gly Lys Lys Ile His Gln Asn Asn Gly Leu Asp
                85                  90                  95

acc gaa tat aat cac aat gga tca ttg tta gcg gga gct tat gca ata   336
Thr Glu Tyr Asn His Asn Gly Ser Leu Leu Ala Gly Ala Tyr Ala Ile
            100                 105                 110

tca acc cta ata aaa caa aaa tta gat gga ttg aaa aat gaa gga tta   384
Ser Thr Leu Ile Lys Gln Lys Leu Asp Gly Leu Lys Asn Glu Gly Leu
        115                 120                 125
```

```
aag gaa aaa att gat gcg gct aag aaa tgt tct gaa aca ttt act aat   432
Lys Glu Lys Ile Asp Ala Ala Lys Lys Cys Ser Glu Thr Phe Thr Asn
    130                 135                 140

aaa tta aaa gaa aaa cac aca gat ctt ggt aaa gaa ggt gtt act gat   480
Lys Leu Lys Glu Lys His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp
145                 150                 155                 160

gct gat gca aaa gaa gcc att tta aaa aca aat ggt act aaa act aaa   528
Ala Asp Ala Lys Glu Ala Ile Leu Lys Thr Asn Gly Thr Lys Thr Lys
                165                 170                 175

ggt gct gaa gaa ctt gga aaa tta ttt gaa tca gta gag gtc ttg tca   576
Gly Ala Glu Glu Leu Gly Lys Leu Phe Glu Ser Val Glu Val Leu Ser
            180                 185                 190

aaa gca gct aaa gag atg ctt gct aat tca gtt aaa gag ctt aca agc   624
Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser
        195                 200                 205

cct gtt gtg gca gaa agt cca gcc atg gta aat aat tca ggg aaa gat   672
Pro Val Val Ala Glu Ser Pro Ala Met Val Asn Asn Ser Gly Lys Asp
    210                 215                 220

ggg aat aca tct gca aat tct gct gat gag tct gtt aaa ggg cct aat   720
Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn
225                 230                 235                 240

ctt aca gaa ata agt aaa aaa att aca gaa tct aac gca gtt gtt ctc   768
Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu
                245                 250                 255

gcc gtg aaa gaa gtt gaa act ttg ctt aca tct ata gat gag ctt gct   816
Ala Val Lys Glu Val Glu Thr Leu Leu Thr Ser Ile Asp Glu Leu Ala
            260                 265                 270

aaa gct att ggt aaa aaa ata aaa aac gat gtt agt tta gat aat gag   864
Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Val Ser Leu Asp Asn Glu
        275                 280                 285

gca gat cac aac gga tca tta ata tca gga gca tat tta att tca aac   912
Ala Asp His Asn Gly Ser Leu Ile Ser Gly Ala Tyr Leu Ile Ser Asn
    290                 295                 300

tta ata aca aaa aaa ata agt gca ata aaa gat tca gga gaa ttg aag   960
Leu Ile Thr Lys Lys Ile Ser Ala Ile Lys Asp Ser Gly Glu Leu Lys
305                 310                 315                 320

gca gaa att gaa aag gct aag aaa tgt tct gaa gaa ttt act gct aaa  1008
Ala Glu Ile Glu Lys Ala Lys Lys Cys Ser Glu Glu Phe Thr Ala Lys
                325                 330                 335

tta aaa ggt gaa cac aca gat ctt ggt aaa gaa ggc gtt act gat gat  1056
Leu Lys Gly Glu His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp Asp
            340                 345                 350

aat gca aaa aaa gcc att tta aaa aca aat aat gat aaa act aag ggc  1104
Asn Ala Lys Lys Ala Ile Leu Lys Thr Asn Asn Asp Lys Thr Lys Gly
        355                 360                 365
```

Sub A1

```
gct gat gaa ctt gaa aag tta ttt gaa tca gta aaa aac ttg tca aaa   1152
Ala Asp Glu Leu Glu Lys Leu Phe Glu Ser Val Lys Asn Leu Ser Lys
    370                 375                 380

gca gct aaa gag atg ctt act aat tca gtt aaa gag ctt aca agc       1197
Ala Ala Lys Glu Met Leu Thr Asn Ser Val Lys Glu Leu Thr Ser
385                 390                 395
```

<210> 60
<211> 398
<212> PRT
<213> ospC Chimera

<400> 60

```
Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys Ala
 1               5                  10                  15
Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys Asp
            20                  25                  30
Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn
        35                  40                  45
Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu Leu
    50                  55                  60
Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Ile Ala
65                  70                  75                  80
Ala Lys Ala Ile Gly Lys Lys Ile His Gln Asn Asn Gly Leu Asp Thr
                85                  90                  95
Glu Tyr Asn His Asn Gly Ser Leu Leu Ala Gly Ala Tyr Ala Ile Ser
            100                 105                 110
Thr Leu Ile Lys Gln Lys Leu Asp Gly Leu Lys Asn Glu Gly Leu Lys
        115                 120                 125
Glu Lys Ile Asp Ala Ala Lys Lys Cys Ser Glu Thr Phe Thr Asn Lys
    130                 135                 140
Leu Lys Glu Lys His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp Ala
145                 150                 155                 160
Asp Ala Lys Glu Ala Ile Leu Lys Thr Asn Gly Thr Lys Thr Lys Gly
                165                 170                 175
Ala Glu Glu Leu Gly Lys Leu Phe Glu Ser Val Glu Val Leu Ser Lys
            180                 185                 190
Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser Pro
        195                 200                 205
Val Val Ala Glu Ser Pro Ala Met Val Asn Asn Ser Gly Lys Asp Gly
    210                 215                 220
Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu
225                 230                 235                 240
Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala
                245                 250                 255
Val Lys Glu Val Glu Thr Leu Leu Thr Ser Ile Asp Glu Leu Ala Lys
            260                 265                 270
Ala Ile Gly Lys Lys Ile Lys Asn Asp Val Ser Leu Asp Asn Glu Ala
        275                 280                 285
Asp His Asn Gly Ser Leu Ile Ser Gly Ala Tyr Leu Ile Ser Asn Leu
    290                 295                 300
Ile Thr Lys Lys Ile Ser Ala Ile Lys Asp Ser Gly Glu Leu Lys Ala
305                 310                 315                 320
Glu Ile Glu Lys Ala Lys Lys Cys Ser Glu Glu Phe Thr Ala Lys Leu
                325                 330                 335
```

Lys Gly Glu His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp Asp Asn
340 345 350
Ala Lys Lys Ala Ile Leu Lys Thr Asn Asn Asp Lys Thr Lys Gly Ala
355 360 365
Asp Glu Leu Glu Lys Leu Phe Glu Ser Val Lys Asn Leu Ser Lys Ala
370 375 380
Ala Lys Glu Met Leu Thr Asn Ser Val Lys Glu Leu Thr Ser
385 390 395

<210> 61
<211> 1196
<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1196)

<400> 61

```
atg aga tta tta ata gga ttt gct tta gcg tta gct tta ata gga tgt   48
Met Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys
 1               5                  10                  15

gca caa aaa ggt gct gag tca att gga tcc tgt aat aat tca ggg aaa   96
Ala Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys
            20                  25                  30

gat ggg aat aca tct gca aat tct gct gat gag tct gtt aaa ggg cct   144
Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro
        35                  40                  45

aat ctt aca gaa ata agt aaa aaa att acg gat tct aat gcg gtt tta   192
Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu
    50                  55                  60

ctt gct gtg aaa gag gtt gaa gcg ttg ctg tca tct ata gat gaa att   240
Leu Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Ile
65                  70                  75                  80

gct gct aaa gct att ggt aaa aaa ata cac caa aat aat ggt ttg gat   288
Ala Ala Lys Ala Ile Gly Lys Lys Ile His Gln Asn Asn Gly Leu Asp
                85                  90                  95

acc gaa tat aat cac aat gga tca ttg tta gcg gga gct tat gca ata   336
Thr Glu Tyr Asn His Asn Gly Ser Leu Leu Ala Gly Ala Tyr Ala Ile
            100                 105                 110

tca acc cta ata aaa caa aaa tta gat gga ttg aaa aat gaa gga tta   384
Ser Thr Leu Ile Lys Gln Lys Leu Asp Gly Leu Lys Asn Glu Gly Leu
        115                 120                 125

aag gaa aaa att gat gcg gct aag aaa tgt tct gaa aca ttt act aat   432
Lys Glu Lys Ile Asp Ala Ala Lys Lys Cys Ser Glu Thr Phe Thr Asn
    130                 135                 140

aaa tta aaa gaa aaa cac aca gat ctt ggt aaa gaa ggt gtt act gat   480
Lys Leu Lys Glu Lys His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp
145                 150                 155                 160
```

Sub A1

```
gct gat gca aaa gaa gcc att tta aaa aca aat ggt act aaa act aaa   528
Ala Asp Ala Lys Glu Ala Ile Leu Lys Thr Asn Gly Thr Lys Thr Lys
                165                 170                 175

ggt gct gaa gaa ctt gga aaa tta ttt gaa tca gta gag gtc ttg tca   576
Gly Ala Glu Glu Leu Gly Lys Leu Phe Glu Ser Val Glu Val Leu Ser
            180                 185                 190

aaa gca gct aaa gag atg ctt gct aat tca gtt aaa gag ctt aca agc   624
Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser
        195                 200                 205

cct gtt gtg gca gaa agt cca gcc atg gta aat aat tca gga aaa gat   672
Pro Val Val Ala Glu Ser Pro Ala Met Val Asn Asn Ser Gly Lys Asp
    210                 215                 220

ggg aat aca tct gca aat tct gct gat gag tct gtt aaa ggg cct aat   720
Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn
225                 230                 235                 240

ctt aca gaa ata agt aaa aaa att aca gaa tct aac gca gtt gtt ctg   768
Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu
                245                 250                 255

gct gtg aaa gaa att gaa act ttg ctt gca tct ata gat gaa ctt gct   816
Ala Val Lys Glu Ile Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala
            260                 265                 270

act aaa gct att ggt aaa aaa ata caa caa aat ggt ggt tta gct gtc   864
Thr Lys Ala Ile Gly Lys Lys Ile Gln Gln Asn Gly Gly Leu Ala Val
        275                 280                 285

gaa gcg ggg cat aat gga aca ttg tta gca ggt gct tat aca ata tca   912
Glu Ala Gly His Asn Gly Thr Leu Leu Ala Gly Ala Tyr Thr Ile Ser
    290                 295                 300

aaa cta ata aca caa aaa tta gat gga ttg aaa aat tca gaa aaa tta   960
Lys Leu Ile Thr Gln Lys Leu Asp Gly Leu Lys Asn Ser Glu Lys Leu
305                 310                 315                 320

aag gaa aaa att gaa aat gct aag aaa tgt tct gaa gat ttt act aaa  1008
Lys Glu Lys Ile Glu Asn Ala Lys Lys Cys Ser Glu Asp Phe Thr Lys
                325                 330                 335

aaa cta gaa gga gaa cat gcg caa ctt gga att gaa aat gtt act gat  1056
Lys Leu Glu Gly Glu His Ala Gln Leu Gly Ile Glu Asn Val Thr Asp
            340                 345                 350

gag aat gca aaa aaa gct att tta ata aca gat gca gct aaa gat aag  1104
Glu Asn Ala Lys Lys Ala Ile Leu Ile Thr Asp Ala Ala Lys Asp Lys
        355                 360                 365

ggc gct gca gag ctt gaa aag cta ttt aaa gca gta gaa aac ttg gca  1152
Gly Ala Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ala
    370                 375                 380
```

```
aaa gca gct aaa gag atg ctt gct aat tca gtt aaa gag ctt ac        1196
Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu
385                 390                 395
```

<210> 62
<211> 397
<212> PRT
<213> ospC Chimera

<400> 62

```
Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys Ala
 1               5                  10                  15
Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys Asp
            20                  25                  30
Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn
        35                  40                  45
Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu Leu
    50                  55                  60
Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Ile Ala
65                  70                  75                  80
Ala Lys Ala Ile Gly Lys Lys Ile His Gln Asn Asn Gly Leu Asp Thr
                85                  90                  95
Glu Tyr Asn His Asn Gly Ser Leu Leu Ala Gly Ala Tyr Ala Ile Ser
            100                 105                 110
Thr Leu Ile Lys Gln Lys Leu Asp Gly Leu Lys Asn Glu Gly Leu Lys
        115                 120                 125
Glu Lys Ile Asp Ala Ala Lys Lys Cys Ser Glu Thr Phe Thr Asn Lys
    130                 135                 140
Leu Lys Glu Lys His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp Ala
145                 150                 155                 160
Asp Ala Lys Glu Ala Ile Leu Lys Thr Asn Gly Thr Lys Thr Lys Gly
                165                 170                 175
Ala Glu Glu Leu Gly Lys Leu Phe Glu Ser Val Glu Val Leu Ser Lys
            180                 185                 190
Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser Pro
        195                 200                 205
Val Val Ala Glu Ser Pro Ala Met Val Asn Asn Ser Gly Lys Asp Gly
    210                 215                 220
Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu
225                 230                 235                 240
Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala
                245                 250                 255
Val Lys Glu Ile Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr
            260                 265                 270
Lys Ala Ile Gly Lys Lys Ile Gln Gln Asn Gly Gly Leu Ala Val Glu
        275                 280                 285
Ala Gly His Asn Gly Thr Leu Leu Ala Gly Ala Tyr Thr Ile Ser Lys
    290                 295                 300
Leu Ile Thr Gln Lys Leu Asp Gly Leu Lys Asn Ser Glu Lys Leu Lys
305                 310                 315                 320
Glu Lys Ile Glu Asn Ala Lys Lys Cys Ser Glu Asp Phe Thr Lys Lys
                325                 330                 335
Leu Glu Gly Glu His Ala Gln Leu Gly Ile Glu Asn Val Thr Asp Glu
            340                 345                 350
Asn Ala Lys Lys Ala Ile Leu Ile Thr Asp Ala Ala Lys Asp Lys Gly
        355                 360                 365
```

Sub A1

```
Ala Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ala Lys
    370                 375                 380
Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu
385                 390                 395
```

<210> 63
<211> 1185
<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1185)

<400> 63

```
atg aga tta tta ata gga ttt gct tta gcg tta gct tta ata gga tgt   48
Met Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys
 1               5                  10                  15

gca caa aaa ggt gct gag tca att gga tcc tgt aat aat tca ggg aaa   96
Ala Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys
            20                  25                  30

gat ggg aat aca tct gca aat tct gct gat gag tct gtt aaa ggg cct   144
Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro
        35                  40                  45

aat ctt aca gaa ata agt aaa aaa att acg gat tct aat gcg gtt tta   192
Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu
    50                  55                  60

ctt gct gtg aaa gag gtt gaa gcg ttg ctg tca tct ata gat gag ctt   240
Leu Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Leu
65                  70                  75                  80

gct aaa gct att ggt aaa aaa ata aaa aac gat ggt agt tta gat aat   288
Ala Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Gly Ser Leu Asp Asn
                85                  90                  95

gaa gca aat cgc aac gag tca ttg tta gca gga gct tat aca ata tca   336
Glu Ala Asn Arg Asn Glu Ser Leu Leu Ala Gly Ala Tyr Thr Ile Ser
            100                 105                 110

acc tta ata aca caa aaa tta agt aaa tta aac gga tca gaa ggt tta   384
Thr Leu Ile Thr Gln Lys Leu Ser Lys Leu Asn Gly Ser Glu Gly Leu
        115                 120                 125

aag gaa aag att gcc gca gct aag aaa tgc tct gaa gag ttt agt act   432
Lys Glu Lys Ile Ala Ala Ala Lys Lys Cys Ser Glu Glu Phe Ser Thr
    130                 135                 140

aaa cta aaa gat aat cat gca cag ctt ggt ata cag ggc gtt act gat   480
Lys Leu Lys Asp Asn His Ala Gln Leu Gly Ile Gln Gly Val Thr Asp
145                 150                 155                 160

gaa aat gca aaa aaa gct att tta aaa gca aat gca gcg ggt aaa gat   528
Glu Asn Ala Lys Lys Ala Ile Leu Lys Ala Asn Ala Ala Gly Lys Asp
                165                 170                 175
```

```
aag ggc gtt gaa gaa ctt gaa aag ttg tcc gga tca tta gaa agc tta   576
Lys Gly Val Glu Glu Leu Glu Lys Leu Ser Gly Ser Leu Glu Ser Leu
            180                 185                 190

tca aaa gca gct aaa gag atg ctt gct aat tca gtt aaa gag ctt aca   624
Ser Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr
        195                 200                 205

agc cct gtt gtc cat ggt aat aat tca ggg aaa gat ggg aat aca tct   672
Ser Pro Val Val His Gly Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser
    210                 215                 220

gca aat tct gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata   720
Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile
225                 230                 235                 240

agt aaa aaa att aca gaa tct aac gca gtt gtt ctc gcc gtg aaa gaa   768
Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu
                245                 250                 255

gtt gaa act ttg ctt aca tct ata gat gag ctt gct aaa gct att ggt   816
Val Glu Thr Leu Leu Thr Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly
            260                 265                 270

aaa aaa ata aaa aac gat gtt agt tta gat aat gag gca gat cac aac   864
Lys Lys Ile Lys Asn Asp Val Ser Leu Asp Asn Glu Ala Asp His Asn
        275                 280                 285

gga tca tta ata tca gga gca tat tta att tca aac tta ata aca aaa   912
Gly Ser Leu Ile Ser Gly Ala Tyr Leu Ile Ser Asn Leu Ile Thr Lys
    290                 295                 300

aaa ata agt gca ata aaa gat tca gga gaa ttg aag gca gaa att gaa   960
Lys Ile Ser Ala Ile Lys Asp Ser Gly Glu Leu Lys Ala Glu Ile Glu
305                 310                 315                 320

aag gct aag aaa tgt tct gaa gaa ttt act gct aaa tta aaa ggt gaa  1008
Lys Ala Lys Lys Cys Ser Glu Glu Phe Thr Ala Lys Leu Lys Gly Glu
                325                 330                 335

cac aca gat ctt ggt aaa gaa ggc gtt act gat gat aat gca aaa aaa  1056
His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp Asp Asn Ala Lys Lys
            340                 345                 350

gcc att tta aaa aca aat aat gat aaa act aag ggc gct gat gaa ctt  1104
Ala Ile Leu Lys Thr Asn Asn Asp Lys Thr Lys Gly Ala Asp Glu Leu
        355                 360                 365

gaa aag tta ttt gaa tca gta aaa aac ttg tca aaa gca gct aaa gag  1152
Glu Lys Leu Phe Glu Ser Val Lys Asn Leu Ser Lys Ala Ala Lys Glu
    370                 375                 380

atg ctt act aat tca gtt aaa gag ctt aca agc                     1185
Met Leu Thr Asn Ser Val Lys Glu Leu Thr Ser
385                 390                 395
```

<210> 64

Sub A1

<211> 394
<212> PRT
<213> ospC Chimera

<400> 64
Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys Ala
1 5 10 15
Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys Asp
20 25 30
Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn
35 40 45
Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu Leu
50 55 60
Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Leu Ala
65 70 75 80
Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Gly Ser Leu Asp Asn Glu
85 90 95
Ala Asn Arg Asn Glu Ser Leu Leu Ala Gly Ala Tyr Thr Ile Ser Thr
100 105 110
Leu Ile Thr Gln Lys Leu Ser Lys Leu Asn Gly Ser Glu Gly Leu Lys
115 120 125
Glu Lys Ile Ala Ala Ala Lys Lys Cys Ser Glu Glu Phe Ser Thr Lys
130 135 140
Leu Lys Asp Asn His Ala Gln Leu Gly Ile Gln Gly Val Thr Asp Glu
145 150 155 160
Asn Ala Lys Lys Ala Ile Leu Lys Ala Asn Ala Ala Gly Lys Asp Lys
165 170 175
Gly Val Glu Glu Leu Glu Lys Leu Ser Gly Ser Leu Glu Ser Leu Ser
180 185 190
Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser
195 200 205
Pro Val Val His Gly Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala
210 215 220
Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser
225 230 235 240
Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val
245 250 255
Glu Thr Leu Leu Thr Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys
260 265 270
Lys Ile Lys Asn Asp Val Ser Leu Asp Asn Glu Ala Asp His Asn Gly
275 280 285
Ser Leu Ile Ser Gly Ala Tyr Leu Ile Ser Asn Leu Ile Thr Lys Lys
290 295 300
Ile Ser Ala Ile Lys Asp Ser Gly Glu Leu Lys Ala Glu Ile Glu Lys
305 310 315 320
Ala Lys Lys Cys Ser Glu Glu Phe Thr Ala Lys Leu Lys Gly Glu His
325 330 335
Thr Asp Leu Gly Lys Glu Gly Val Thr Asp Asp Asn Ala Lys Lys Ala
340 345 350
Ile Leu Lys Thr Asn Asn Asp Lys Thr Lys Gly Ala Asp Glu Leu Glu
355 360 365
Lys Leu Phe Glu Ser Val Lys Asn Leu Ser Lys Ala Ala Lys Glu Met
370 375 380
Leu Thr Asn Ser Val Lys Glu Leu Thr Ser
385 390

<210> 65
<211> 1184

Sub A1

<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1184)

<400> 65

```
atg aga tta tta ata gga ttt gct tta gcg tta gct tta ata gga tgt   48
Met Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys
 1               5                  10                  15

gca caa aaa ggt gct gag tca att gga tcc tgt aat aat tca ggg aaa   96
Ala Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys
            20                  25                  30

gat ggg aat aca tct gca aat tct gct gat gag tct gtt aaa ggg cct   144
Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro
        35                  40                  45

aat ctt aca gaa ata agt aaa aaa att acg gat tct aat gcg gtt tta   192
Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu
    50                  55                  60

ctt gct gtg aaa gag gtt gaa gcg ttg ctg tca tct ata gat gag ctt   240
Leu Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Leu
65                  70                  75                  80

gct aaa gct att ggt aaa aaa ata aaa aac gat ggt agt tta gat aat   288
Ala Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Gly Ser Leu Asp Asn
                85                  90                  95

gaa gca aat cgc aac gag tca ttg tta gca gga gct tat aca ata tca   336
Glu Ala Asn Arg Asn Glu Ser Leu Leu Ala Gly Ala Tyr Thr Ile Ser
            100                 105                 110

acc tta ata aca caa aaa tta agt aaa tta aac gga tca gaa ggt tta   384
Thr Leu Ile Thr Gln Lys Leu Ser Lys Leu Asn Gly Ser Glu Gly Leu
        115                 120                 125

aag gaa aag att gcc gca gct aag aaa tgc tct gaa gag ttt agt act   432
Lys Glu Lys Ile Ala Ala Ala Lys Lys Cys Ser Glu Glu Phe Ser Thr
    130                 135                 140

aaa cta aaa gat aat cat gca cag ctt ggt ata cag ggc gtt act gat   480
Lys Leu Lys Asp Asn His Ala Gln Leu Gly Ile Gln Gly Val Thr Asp
145                 150                 155                 160

gaa aat gca aaa aaa gct att tta aaa gca aat gca gcg ggt aaa gat   528
Glu Asn Ala Lys Lys Ala Ile Leu Lys Ala Asn Ala Ala Gly Lys Asp
                165                 170                 175

aag ggc gtt gaa gaa ctt gaa aag ttg tcc gga tca tta gaa agc tta   576
Lys Gly Val Glu Glu Leu Glu Lys Leu Ser Gly Ser Leu Glu Ser Leu
            180                 185                 190

tca aaa gca gct aaa gag atg ctt gct aat tca gtt aaa gag ctt aca   624
Ser Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr
        195                 200                 205
```

Sub A1

```
agc cct gtt gtc cat ggt aat aat tca gga aaa gat ggg aat aca tct   672
Ser Pro Val Val His Gly Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser
    210                 215                 220

gca aat tct gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata   720
Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile
225                 230                 235                 240

agt aaa aaa att aca gaa tct aac gca gtt gtt ctg gct gtg aaa gaa   768
Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu
                245                 250                 255

att gaa act ttg ctt gca tct ata gat gaa ctt gct act aaa gct att   816
Ile Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile
            260                 265                 270

ggt aaa aaa ata caa caa aat ggt ggt tta gct gtc gaa gcg ggg cat   864
Gly Lys Lys Ile Gln Gln Asn Gly Gly Leu Ala Val Glu Ala Gly His
        275                 280                 285

aat gga aca ttg tta gca ggt gct tat aca ata tca aaa cta ata aca   912
Asn Gly Thr Leu Leu Ala Gly Ala Tyr Thr Ile Ser Lys Leu Ile Thr
    290                 295                 300

caa aaa tta gat gga ttg aaa aat tca gaa aaa tta aag gaa aaa att   960
Gln Lys Leu Asp Gly Leu Lys Asn Ser Glu Lys Leu Lys Glu Lys Ile
305                 310                 315                 320

gaa aat gct aag aaa tgt tct gaa gat ttt act aaa aaa cta gaa gga   1008
Glu Asn Ala Lys Lys Cys Ser Glu Asp Phe Thr Lys Lys Leu Glu Gly
                325                 330                 335

gaa cat gcg caa ctt gga att gaa aat gtt act gat gag aat gca aaa   1056
Glu His Ala Gln Leu Gly Ile Glu Asn Val Thr Asp Glu Asn Ala Lys
            340                 345                 350

aaa gct att tta ata aca gat gca gct aaa gat aag ggc gct gca gag   1104
Lys Ala Ile Leu Ile Thr Asp Ala Ala Lys Asp Lys Gly Ala Ala Glu
        355                 360                 365

ctt gaa aag cta ttt aaa gca gta gaa aac ttg gca aaa gca gct aaa   1152
Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ala Lys Ala Ala Lys
    370                 375                 380

gag atg ctt gct aat tca gtt aaa gag ctt ac                       1184
Glu Met Leu Ala Asn Ser Val Lys Glu Leu
385                 390


<210> 66
<211> 393
<212> PRT
<213> ospC Chimera

<400> 66
Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys Ala
 1               5                  10                  15
```

Sub A1

```
Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys Asp
            20                  25                  30
Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn
        35                  40                  45
Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu Leu
    50                  55                  60
Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Leu Ala
65                  70                  75                  80
Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Gly Ser Leu Asp Asn Glu
                85                  90                  95
Ala Asn Arg Asn Glu Ser Leu Leu Ala Gly Ala Tyr Thr Ile Ser Thr
            100                 105                 110
Leu Ile Thr Gln Lys Leu Ser Lys Leu Asn Gly Ser Glu Gly Leu Lys
        115                 120                 125
Glu Lys Ile Ala Ala Ala Lys Lys Cys Ser Glu Glu Phe Ser Thr Lys
    130                 135                 140
Leu Lys Asp Asn His Ala Gln Leu Gly Ile Gln Gly Val Thr Asp Glu
145                 150                 155                 160
Asn Ala Lys Lys Ala Ile Leu Lys Ala Asn Ala Ala Gly Lys Asp Lys
                165                 170                 175
Gly Val Glu Glu Leu Glu Lys Leu Ser Gly Ser Leu Glu Ser Leu Ser
            180                 185                 190
Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser
        195                 200                 205
Pro Val Val His Gly Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala
    210                 215                 220
Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser
225                 230                 235                 240
Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Ile
                245                 250                 255
Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly
            260                 265                 270
Lys Lys Ile Gln Gln Asn Gly Gly Leu Ala Val Glu Ala Gly His Asn
        275                 280                 285
Gly Thr Leu Leu Ala Gly Ala Tyr Thr Ile Ser Lys Leu Ile Thr Gln
    290                 295                 300
Lys Leu Asp Gly Leu Lys Asn Ser Glu Lys Leu Lys Glu Lys Ile Glu
305                 310                 315                 320
Asn Ala Lys Lys Cys Ser Glu Asp Phe Thr Lys Lys Leu Glu Gly Glu
                325                 330                 335
His Ala Gln Leu Gly Ile Glu Asn Val Thr Asp Glu Asn Ala Lys Lys
            340                 345                 350
Ala Ile Leu Ile Thr Asp Ala Ala Lys Asp Lys Gly Ala Ala Glu Leu
        355                 360                 365
Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ala Lys Ala Ala Lys Glu
    370                 375                 380
Met Leu Ala Asn Ser Val Lys Glu Leu
385                 390
```

<210> 67
<211> 1184
<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1184)

<400> 67

```
atg aga tta tta ata gga ttt gct tta gcg tta gct tta ata gga tgt   48
Met Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys
 1               5                  10                  15

gca caa aaa ggt gct gag tca att gga tcc tgt aat aat tca ggg aaa   96
Ala Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys
            20                  25                  30

gat ggg aat aca tct gca aat tct gct gat gag tct gtt aaa ggg cct   144
Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro
        35                  40                  45

aat ctt aca gaa ata agt aaa aaa att acg gat tct aat gcg gtt tta   192
Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu
    50                  55                  60

ctt gct gtg aaa gag gtt gaa gcg ttg ctg tca tct ata gat gag ctt   240
Leu Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Leu
65                  70                  75                  80

gct aaa gct att ggt aaa aaa ata aaa aac gat ggt agt tta gat aat   288
Ala Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Gly Ser Leu Asp Asn
                85                  90                  95

gaa gca aat cgc aac gag tca ttg tta gca gga gct tat aca ata tca   336
Glu Ala Asn Arg Asn Glu Ser Leu Leu Ala Gly Ala Tyr Thr Ile Ser
            100                 105                 110

acc tta ata aca caa aaa tta agt aaa tta aac gga tca gaa ggt tta   384
Thr Leu Ile Thr Gln Lys Leu Ser Lys Leu Asn Gly Ser Glu Gly Leu
        115                 120                 125

aag gaa aag att gcc gca gct aag aaa tgc tct gaa gag ttt agt act   432
Lys Glu Lys Ile Ala Ala Ala Lys Lys Cys Ser Glu Glu Phe Ser Thr
    130                 135                 140

aaa cta aaa gat aat cat gca cag ctt ggt ata cag ggc gtt act gat   480
Lys Leu Lys Asp Asn His Ala Gln Leu Gly Ile Gln Gly Val Thr Asp
145                 150                 155                 160

gaa aat gca aaa aaa gct att tta aaa gca aat gca gcg ggt aaa gat   528
Glu Asn Ala Lys Lys Ala Ile Leu Lys Ala Asn Ala Ala Gly Lys Asp
                165                 170                 175

aag ggc gtt gaa gaa ctt gaa aag ttg tcc gga tca tta gaa agc tta   576
Lys Gly Val Glu Glu Leu Glu Lys Leu Ser Gly Ser Leu Glu Ser Leu
            180                 185                 190

tca aaa gca gct aaa gag atg ctt gct aat tca gtt aaa gag ctt aca   624
Ser Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr
        195                 200                 205

agc cct gtt gtc cat ggt aat aat tca aga aaa gat ggg aat gca tct   672
Ser Pro Val Val His Gly Asn Asn Ser Arg Lys Asp Gly Asn Ala Ser
    210                 215                 220
```

```
aca aat tct gcc gat gag tct gtt aaa ggg cct aat ctt aca gaa ata   720
Thr Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile
225                 230                 235                 240

agt aaa aaa att aca gaa tct aac gca gtt gtt ctg gcc gtg aaa gaa   768
Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu
                245                 250                 255

gtt gag acc tta ctt gca tct ata gat gaa ctt gct acc aaa gct att   816
Val Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile
            260                 265                 270

ggt aag aaa ata ggc aat aat ggt tta gag gcc aat cag agt aaa aac   864
Gly Lys Lys Ile Gly Asn Asn Gly Leu Glu Ala Asn Gln Ser Lys Asn
        275                 280                 285

aca tca ttg tta tca gga gct tat gca ata tct gac cta ata gca gaa   912
Thr Ser Leu Leu Ser Gly Ala Tyr Ala Ile Ser Asp Leu Ile Ala Glu
    290                 295                 300

aaa tta aat gta ttg aaa aat gaa gaa tta aag gaa aag att gat aca   960
Lys Leu Asn Val Leu Lys Asn Glu Glu Leu Lys Glu Lys Ile Asp Thr
305                 310                 315                 320

gct aag caa tgt tct aca gaa ttt act aat aaa cta aaa agt gaa cat  1008
Ala Lys Gln Cys Ser Thr Glu Phe Thr Asn Lys Leu Lys Ser Glu His
                325                 330                 335

gca gtg ctt ggt ctg gac aat ctt act gat gat aat gca caa aga gct  1056
Ala Val Leu Gly Leu Asp Asn Leu Thr Asp Asp Asn Ala Gln Arg Ala
            340                 345                 350

att tta aaa aaa cat gca aat aaa gat aag ggt gct gca gaa ctt gaa  1104
Ile Leu Lys Lys His Ala Asn Lys Asp Lys Gly Ala Ala Glu Leu Glu
        355                 360                 365

aag tta ttt aaa gcg gta gaa aac tta tca aaa gca gct caa gac aca  1152
Lys Leu Phe Lys Ala Val Glu Asn Leu Ser Lys Ala Ala Gln Asp Thr
    370                 375                 380

tta aaa aat gct gtt aaa gag ctt aca agt cc                      1184
Leu Lys Asn Ala Val Lys Glu Leu Thr Ser
385                 390


<210> 68
<211> 393
<212> PRT
<213> ospC Chimera

<400> 68
Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys Ala
 1               5                  10                  15
Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys Asp
            20                  25                  30
Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn
        35                  40                  45
Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu Leu
    50                  55                  60
```

Sub A1

```
Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Leu Ala
65                  70                  75                  80
Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Gly Ser Leu Asp Asn Glu
                85                  90                  95
Ala Asn Arg Asn Glu Ser Leu Leu Ala Gly Ala Tyr Thr Ile Ser Thr
            100                 105                 110
Leu Ile Thr Gln Lys Leu Ser Lys Leu Asn Gly Ser Glu Gly Leu Lys
        115                 120                 125
Glu Lys Ile Ala Ala Ala Lys Lys Cys Ser Glu Glu Phe Ser Thr Lys
    130                 135                 140
Leu Lys Asp Asn His Ala Gln Leu Gly Ile Gln Gly Val Thr Asp Glu
145                 150                 155                 160
Asn Ala Lys Lys Ala Ile Leu Lys Ala Asn Ala Ala Gly Lys Asp Lys
                165                 170                 175
Gly Val Glu Glu Leu Glu Lys Leu Ser Gly Ser Leu Glu Ser Leu Ser
            180                 185                 190
Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser
        195                 200                 205
Pro Val Val His Gly Asn Asn Ser Arg Lys Asp Gly Asn Ala Ser Thr
    210                 215                 220
Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser
225                 230                 235                 240
Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val
                245                 250                 255
Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly
            260                 265                 270
Lys Lys Ile Gly Asn Asn Gly Leu Glu Ala Asn Gln Ser Lys Asn Thr
        275                 280                 285
Ser Leu Leu Ser Gly Ala Tyr Ala Ile Ser Asp Leu Ile Ala Glu Lys
    290                 295                 300
Leu Asn Val Leu Lys Asn Glu Glu Leu Lys Glu Lys Ile Asp Thr Ala
305                 310                 315                 320
Lys Gln Cys Ser Thr Glu Phe Thr Asn Lys Leu Lys Ser Glu His Ala
                325                 330                 335
Val Leu Gly Leu Asp Asn Leu Thr Asp Asp Asn Ala Gln Arg Ala Ile
            340                 345                 350
Leu Lys Lys His Ala Asn Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys
        355                 360                 365
Leu Phe Lys Ala Val Glu Asn Leu Ser Lys Ala Ala Gln Asp Thr Leu
    370                 375                 380
Lys Asn Ala Val Lys Glu Leu Thr Ser
385                 390
```

<210> 69
<211> 1209
<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1209)

<400> 69

```
atg aga tta tta ata gga ttt gct tta gcg tta gct tta ata gga tgt   48
Met Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys
 1               5                  10                  15
```

Sub A1

```
gca caa aaa ggt gct gag tca att gga tcc tgt aat aat tca ggg aaa    96
Ala Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys
            20                  25                  30

gat ggg aat aca tct gca aat tct gct gat gag tct gtt aaa ggg cct   144
Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro
        35                  40                  45

aat ctt aca gaa ata agt aaa aaa att acg gat tct aat gcg gtt tta   192
Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu
    50                  55                  60

ctt gct gtg aaa gag gtt gaa gcg ttg ctg tca tct ata gat gag ctt   240
Leu Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Leu
65                  70                  75                  80

gct aaa gct att ggt aaa aaa ata aaa aac gat ggt agt tta gat aat   288
Ala Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Gly Ser Leu Asp Asn
                85                  90                  95

gaa gca aat cgc aac gag tca ttg tta gca gga gct tat aca ata tca   336
Glu Ala Asn Arg Asn Glu Ser Leu Leu Ala Gly Ala Tyr Thr Ile Ser
            100                 105                 110

acc tta ata aca caa aaa tta agt aaa tta aac gga tca gaa ggt tta   384
Thr Leu Ile Thr Gln Lys Leu Ser Lys Leu Asn Gly Ser Glu Gly Leu
        115                 120                 125

aag gaa aag att gcc gca gct aag aaa tgc tct gaa gag ttt agt act   432
Lys Glu Lys Ile Ala Ala Ala Lys Lys Cys Ser Glu Glu Phe Ser Thr
    130                 135                 140

aaa cta aaa gat aat cat gca cag ctt ggt ata cag ggc gtt act gat   480
Lys Leu Lys Asp Asn His Ala Gln Leu Gly Ile Gln Gly Val Thr Asp
145                 150                 155                 160

gaa aat gca aaa aaa gct att tta aaa gca aat gca gcg ggt aaa gat   528
Glu Asn Ala Lys Lys Ala Ile Leu Lys Ala Asn Ala Ala Gly Lys Asp
                165                 170                 175

aag ggc gtt gaa gaa ctt gaa aag ttg tcc gga tca tta gaa agc tta   576
Lys Gly Val Glu Glu Leu Glu Lys Leu Ser Gly Ser Leu Glu Ser Leu
            180                 185                 190

tca aaa gca gct aaa gag atg ctt gct aat tca gtt aaa gag ctt aca   624
Ser Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr
        195                 200                 205

agc cct gtt gtc cat ggt aat aat tca ggt ggg gat tct gca tct act   672
Ser Pro Val Val His Gly Asn Asn Ser Gly Gly Asp Ser Ala Ser Thr
    210                 215                 220

aat cct gat gag tct gca aaa gga cct aat ctt acc gta ata agc aaa   720
Asn Pro Asp Glu Ser Ala Lys Gly Pro Asn Leu Thr Val Ile Ser Lys
225                 230                 235                 240

aaa att aca gat tct aat gca ttt tta ctg gct gtg aaa gaa gtt gag   768
Lys Ile Thr Asp Ser Asn Ala Phe Leu Leu Ala Val Lys Glu Val Glu
                245                 250                 255
```

```
gct ttg ctt tca tct ata gat gaa ctt tct aaa gct att ggt aaa aaa   816
Ala Leu Leu Ser Ser Ile Asp Glu Leu Ser Lys Ala Ile Gly Lys Lys
            260                 265                 270

ata aaa aat gat ggt act tta gat aac gaa gca aat cga aac gaa tca   864
Ile Lys Asn Asp Gly Thr Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser
        275                 280                 285

ttg ata gca gga gct tat gaa ata tca aaa cta ata aca caa aaa tta   912
Leu Ile Ala Gly Ala Tyr Glu Ile Ser Lys Leu Ile Thr Gln Lys Leu
    290                 295                 300

agt gta ttg aat tca gaa gaa tta aag aaa aaa att aaa gag gct aag   960
Ser Val Leu Asn Ser Glu Glu Leu Lys Lys Lys Ile Lys Glu Ala Lys
305                 310                 315                 320

gat tgt tcc caa aaa ttt act act aag cta aaa gat agt cat gca gag  1008
Asp Cys Ser Gln Lys Phe Thr Thr Lys Leu Lys Asp Ser His Ala Glu
                325                 330                 335

ctt ggt ata caa agc gtt cag gat gat aat gca aaa aaa gct att tta  1056
Leu Gly Ile Gln Ser Val Gln Asp Asp Asn Ala Lys Lys Ala Ile Leu
            340                 345                 350

aaa aca cat gga act aaa gac aag ggt gct aaa gaa ctt gaa gag tta  1104
Lys Thr His Gly Thr Lys Asp Lys Gly Ala Lys Glu Leu Glu Glu Leu
        355                 360                 365

ttt aaa tca cta gaa agc ttg tca aaa gca gcg caa gca gca tta act  1152
Phe Lys Ser Leu Glu Ser Leu Ser Lys Ala Ala Gln Ala Ala Leu Thr
    370                 375                 380

aat tca gtt aaa gag ctt aca aat cct gtt gtg gca gaa agt cca aaa  1200
Asn Ser Val Lys Glu Leu Thr Asn Pro Val Val Ala Glu Ser Pro Lys
385                 390                 395                 400

aaa cct taa                                                     1209
Lys Pro  *
```

<210> 70
<211> 401
<212> PRT
<213> ospC Chimera

<400> 70

```
Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys Ala
 1               5                  10                  15
Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys Asp
            20                  25                  30
Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn
        35                  40                  45
Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu Leu
    50                  55                  60
Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Leu Ala
65                  70                  75                  80
```

Sub A1

```
Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Gly Ser Leu Asp Asn Glu
                85                  90                  95
Ala Asn Arg Asn Glu Ser Leu Leu Ala Gly Ala Tyr Thr Ile Ser Thr
            100                 105                 110
Leu Ile Thr Gln Lys Leu Ser Lys Leu Asn Gly Ser Glu Gly Leu Lys
        115                 120                 125
Glu Lys Ile Ala Ala Ala Lys Lys Cys Ser Glu Glu Phe Ser Thr Lys
    130                 135                 140
Leu Lys Asp Asn His Ala Gln Leu Gly Ile Gln Gly Val Thr Asp Glu
145                 150                 155                 160
Asn Ala Lys Lys Ala Ile Leu Lys Ala Asn Ala Ala Gly Lys Asp Lys
                165                 170                 175
Gly Val Glu Glu Leu Glu Lys Leu Ser Gly Ser Leu Glu Ser Leu Ser
            180                 185                 190
Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser
        195                 200                 205
Pro Val Val His Gly Asn Asn Ser Gly Gly Asp Ser Ala Ser Thr Asn
    210                 215                 220
Pro Asp Glu Ser Ala Lys Gly Pro Asn Leu Thr Val Ile Ser Lys Lys
225                 230                 235                 240
Ile Thr Asp Ser Asn Ala Phe Leu Leu Ala Val Lys Glu Val Glu Ala
                245                 250                 255
Leu Leu Ser Ser Ile Asp Glu Leu Ser Lys Ala Ile Gly Lys Lys Ile
            260                 265                 270
Lys Asn Asp Gly Thr Leu Asp Asn Glu Ala Asn Arg Asn Glu Ser Leu
        275                 280                 285
Ile Ala Gly Ala Tyr Glu Ile Ser Lys Leu Ile Thr Gln Lys Leu Ser
    290                 295                 300
Val Leu Asn Ser Glu Glu Leu Lys Lys Lys Ile Lys Glu Ala Lys Asp
305                 310                 315                 320
Cys Ser Gln Lys Phe Thr Thr Lys Leu Lys Asp Ser His Ala Glu Leu
                325                 330                 335
Gly Ile Gln Ser Val Gln Asp Asp Asn Ala Lys Lys Ala Ile Leu Lys
            340                 345                 350
Thr His Gly Thr Lys Asp Lys Gly Ala Lys Glu Leu Glu Glu Leu Phe
        355                 360                 365
Lys Ser Leu Glu Ser Leu Ser Lys Ala Ala Gln Ala Ala Leu Thr Asn
    370                 375                 380
Ser Val Lys Glu Leu Thr Asn Pro Val Val Ala Glu Ser Pro Lys Lys
385                 390                 395                 400
Pro
```

<210> 71
<211> 1179
<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1179)

<400> 71

```
atg aga tta tta ata gga ttt gct tta gcg tta gct tta ata gga tgt      48
Met Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys
 1               5                  10                  15
```

```
gca caa aaa ggt gct gag tca att gga tcc tgt aat aat tca gga aaa   96
Ala Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys
            20                  25                  30

gat ggg aat gca tct gca aat tct gct gat gag tct gtt aaa ggg cct  144
Asp Gly Asn Ala Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro
        35                  40                  45

aat ctt aca gaa ata agt aaa aaa att aca gaa tct aac gca gtt gtt  192
Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val
    50                  55                  60

ctg gcc gtg aaa gaa gtt gag acc tta ctt gca tct ata gat gaa ctt  240
Leu Ala Val Lys Glu Val Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu
65                  70                  75                  80

gct acc aaa gct att ggt aaa aaa ata ggc aat aat ggt tta gag gcc  288
Ala Thr Lys Ala Ile Gly Lys Lys Ile Gly Asn Asn Gly Leu Glu Ala
                85                  90                  95

aat cag agt aaa aac aca tca ttg tta tca gga gct tat gca ata tct  336
Asn Gln Ser Lys Asn Thr Ser Leu Leu Ser Gly Ala Tyr Ala Ile Ser
            100                 105                 110

gac cta ata gca gaa aaa tta aat gta ttg aaa aat gaa gaa tta aag  384
Asp Leu Ile Ala Glu Lys Leu Asn Val Leu Lys Asn Glu Glu Leu Lys
        115                 120                 125

gaa aag att gat aca gct aag caa tgt tct aca gaa ttt act aat aaa  432
Glu Lys Ile Asp Thr Ala Lys Gln Cys Ser Thr Glu Phe Thr Asn Lys
    130                 135                 140

cta aaa agt gaa cat gca gtg ctt ggt ctg gac aat ctt act gat gat  480
Leu Lys Ser Glu His Ala Val Leu Gly Leu Asp Asn Leu Thr Asp Asp
145                 150                 155                 160

aat gca caa aga gct att tta aaa aaa cat gca aat aaa gat aag ggt  528
Asn Ala Gln Arg Ala Ile Leu Lys Lys His Ala Asn Lys Asp Lys Gly
                165                 170                 175

gct gca gaa ctt gaa aag tta ttt aaa gcg gta gaa aac tta tca aaa  576
Ala Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ser Lys
            180                 185                 190

gca gct caa gac aca tta aaa aat gct gtt aaa gag ctt aca agt cct  624
Ala Ala Gln Asp Thr Leu Lys Asn Ala Val Lys Glu Leu Thr Ser Pro
        195                 200                 205

att gtc cat ggt aat aat tca ggg aaa gat ggg aat aca tct gca aat  672
Ile Val His Gly Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn
    210                 215                 220

tct gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa  720
Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys
225                 230                 235                 240

aaa att aca gaa tct aac gca gtt gtt ctc gcc gtg aaa gaa gtt gaa  768
Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val Glu
                245                 250                 255
```

```
act ttg ctt aca tct ata gat gag ctt gct aaa gct att ggt aaa aaa   816
Thr Leu Leu Thr Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys Lys
            260                 265                 270

ata aaa aac gat gtt agt tta gat aat gag gca gat cac aac gga tca   864
Ile Lys Asn Asp Val Ser Leu Asp Asn Glu Ala Asp His Asn Gly Ser
        275                 280                 285

tta ata tca gga gca tat tta att tca aac tta ata aca aaa aaa ata   912
Leu Ile Ser Gly Ala Tyr Leu Ile Ser Asn Leu Ile Thr Lys Lys Ile
    290                 295                 300

agt gca ata aaa gat tca gga gaa ttg aag gca gaa att gaa aag gct   960
Ser Ala Ile Lys Asp Ser Gly Glu Leu Lys Ala Glu Ile Glu Lys Ala
305                 310                 315                 320

aag aaa tgt tct gaa gaa ttt act gct aaa tta aaa ggt gaa cac aca   1008
Lys Lys Cys Ser Glu Glu Phe Thr Ala Lys Leu Lys Gly Glu His Thr
                325                 330                 335

gat ctt ggt aaa gaa ggc gtt act gat gat aat gca aaa aaa gcc att   1056
Asp Leu Gly Lys Glu Gly Val Thr Asp Asp Asn Ala Lys Lys Ala Ile
            340                 345                 350

tta aaa aca aat aat gat aaa act aag ggc gct gat gaa ctt gaa aag   1104
Leu Lys Thr Asn Asn Asp Lys Thr Lys Gly Ala Asp Glu Leu Glu Lys
        355                 360                 365

tta ttt gaa tca gta aaa aac ttg tca aaa gca gct aaa gag atg ctt   1152
Leu Phe Glu Ser Val Lys Asn Leu Ser Lys Ala Ala Lys Glu Met Leu
    370                 375                 380

act aat tca gtt aaa gag ctt aca agc                             1179
Thr Asn Ser Val Lys Glu Leu Thr Ser
385                 390


<210> 72
<211> 392
<212> PRT
<213> ospC Chimera

<400> 72
Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys Ala
 1               5                  10                  15
Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys Asp
            20                  25                  30
Gly Asn Ala Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn
        35                  40                  45
Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu
    50                  55                  60
Ala Val Lys Glu Val Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala
65                  70                  75                  80
Thr Lys Ala Ile Gly Lys Lys Ile Gly Asn Asn Gly Leu Glu Ala Asn
                85                  90                  95
Gln Ser Lys Asn Thr Ser Leu Leu Ser Gly Ala Tyr Ala Ile Ser Asp
            100                 105                 110
```

```
Leu Ile Ala Glu Lys Leu Asn Val Leu Lys Asn Glu Glu Leu Lys Glu
        115                 120                 125
Lys Ile Asp Thr Ala Lys Gln Cys Ser Thr Glu Phe Thr Asn Lys Leu
    130                 135                 140
Lys Ser Glu His Ala Val Leu Gly Leu Asp Asn Leu Thr Asp Asp Asn
145                 150                 155                 160
Ala Gln Arg Ala Ile Leu Lys Lys His Ala Asn Lys Asp Lys Gly Ala
                165                 170                 175
Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ser Lys Ala
            180                 185                 190
Ala Gln Asp Thr Leu Lys Asn Ala Val Lys Glu Leu Thr Ser Pro Ile
        195                 200                 205
Val His Gly Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
    210                 215                 220
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
225                 230                 235                 240
Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val Glu Thr
                245                 250                 255
Leu Leu Thr Ser Ile Asp Glu Leu Ala Lys Ala Ile Gly Lys Lys Ile
            260                 265                 270
Lys Asn Asp Val Ser Leu Asp Asn Glu Ala Asp His Asn Gly Ser Leu
        275                 280                 285
Ile Ser Gly Ala Tyr Leu Ile Ser Asn Leu Ile Thr Lys Lys Ile Ser
    290                 295                 300
Ala Ile Lys Asp Ser Gly Glu Leu Lys Ala Glu Ile Glu Lys Ala Lys
305                 310                 315                 320
Lys Cys Ser Glu Glu Phe Thr Ala Lys Leu Lys Gly Glu His Thr Asp
                325                 330                 335
Leu Gly Lys Glu Gly Val Thr Asp Asp Asn Ala Lys Lys Ala Ile Leu
            340                 345                 350
Lys Thr Asn Asn Asp Lys Thr Lys Gly Ala Asp Glu Leu Glu Lys Leu
        355                 360                 365
Phe Glu Ser Val Lys Asn Leu Ser Lys Ala Ala Lys Glu Met Leu Thr
    370                 375                 380
Asn Ser Val Lys Glu Leu Thr Ser
385                 390
```

<210> 73
<211> 1178
<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1178)

<400> 73

```
atg aga tta tta ata gga ttt gct tta gcg tta gct tta ata gga tgt   48
Met Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys
 1               5                  10                  15

gca caa aaa ggt gct gag tca att gga tcc tgt aat aat tca gga aaa   96
Ala Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys
            20                  25                  30

gat ggg aat gca tct gca aat tct gct gat gag tct gtt aaa ggg cct   144
Asp Gly Asn Ala Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro
        35                  40                  45
```

Sub A1

```
aat ctt aca gaa ata agt aaa aaa att aca gaa tct aac gca gtt gtt   192
Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val
     50                  55                  60

ctg gcc gtg aaa gaa gtt gag acc tta ctt gca tct ata gat gaa ctt   240
Leu Ala Val Lys Glu Val Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu
 65                  70                  75                  80

gct acc aaa gct att ggt aaa aaa ata ggc aat aat ggt tta gag gcc   288
Ala Thr Lys Ala Ile Gly Lys Lys Ile Gly Asn Asn Gly Leu Glu Ala
                 85                  90                  95

aat cag agt aaa aac aca tca ttg tta tca gga gct tat gca ata tct   336
Asn Gln Ser Lys Asn Thr Ser Leu Leu Ser Gly Ala Tyr Ala Ile Ser
            100                 105                 110

gac cta ata gca gaa aaa tta aat gta ttg aaa aat gaa gaa tta aag   384
Asp Leu Ile Ala Glu Lys Leu Asn Val Leu Lys Asn Glu Glu Leu Lys
        115                 120                 125

gaa aag att gat aca gct aag caa tgt tct aca gaa ttt act aat aaa   432
Glu Lys Ile Asp Thr Ala Lys Gln Cys Ser Thr Glu Phe Thr Asn Lys
    130                 135                 140

cta aaa agt gaa cat gca gtg ctt ggt ctg gac aat ctt act gat gat   480
Leu Lys Ser Glu His Ala Val Leu Gly Leu Asp Asn Leu Thr Asp Asp
145                 150                 155                 160

aat gca caa aga gct att tta aaa aaa cat gca aat aaa gat aag ggt   528
Asn Ala Gln Arg Ala Ile Leu Lys Lys His Ala Asn Lys Asp Lys Gly
                165                 170                 175

gct gca gaa ctt gaa aag tta ttt aaa gcg gta gaa aac tta tca aaa   576
Ala Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ser Lys
            180                 185                 190

gca gct caa gac aca tta aaa aat gct gtt aaa gag ctt aca agt cct   624
Ala Ala Gln Asp Thr Leu Lys Asn Ala Val Lys Glu Leu Thr Ser Pro
        195                 200                 205

att gtc cat ggt aat aat tca gga aaa gat ggg aat aca tct gca aat   672
Ile Val His Gly Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn
    210                 215                 220

tct gct gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa   720
Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys
225                 230                 235                 240

aaa att aca gaa tct aac gca gtt gtt ctg gct gtg aaa gaa att gaa   768
Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Ile Glu
                245                 250                 255

act ttg ctt gca tct ata gat gaa ctt gct act aaa gct att ggt aaa   816
Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly Lys
            260                 265                 270
```

```
aaa ata caa caa aat ggt ggt tta gct gtc gaa gcg ggg cat aat gga   864
Lys Ile Gln Gln Asn Gly Gly Leu Ala Val Glu Ala Gly His Asn Gly
        275                 280                 285

aca ttg tta gca ggt gct tat aca ata tca aaa cta ata aca caa aaa   912
Thr Leu Leu Ala Gly Ala Tyr Thr Ile Ser Lys Leu Ile Thr Gln Lys
    290                 295                 300

tta gat gga ttg aaa aat tca gaa aaa tta aag gaa aaa att gaa aat   960
Leu Asp Gly Leu Lys Asn Ser Glu Lys Leu Lys Glu Lys Ile Glu Asn
305                 310                 315                 320

gct aag aaa tgt tct gaa gat ttt act aaa aaa cta gaa gga gaa cat   1008
Ala Lys Lys Cys Ser Glu Asp Phe Thr Lys Lys Leu Glu Gly Glu His
                325                 330                 335

gcg caa ctt gga att gaa aat gtt act gat gag aat gca aaa aaa gct   1056
Ala Gln Leu Gly Ile Glu Asn Val Thr Asp Glu Asn Ala Lys Lys Ala
            340                 345                 350

att tta ata aca gat gca gct aaa gat aag ggc gct gca gag ctt gaa   1104
Ile Leu Ile Thr Asp Ala Ala Lys Asp Lys Gly Ala Ala Glu Leu Glu
        355                 360                 365

aag cta ttt aaa gca gta gaa aac ttg gca aaa gca gct aaa gag atg   1152
Lys Leu Phe Lys Ala Val Glu Asn Leu Ala Lys Ala Ala Lys Glu Met
    370                 375                 380

ctt gct aat tca gtt aaa gag ctt ac                               1178
Leu Ala Asn Ser Val Lys Glu Leu
385                 390
```

<210> 74
<211> 391
<212> PRT
<213> ospC Chimera

<400> 74

```
Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys Ala
 1               5                  10                  15
Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys Asp
            20                  25                  30
Gly Asn Ala Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn
        35                  40                  45
Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu
    50                  55                  60
Ala Val Lys Glu Val Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala
65                  70                  75                  80
Thr Lys Ala Ile Gly Lys Lys Ile Gly Asn Asn Gly Leu Glu Ala Asn
                85                  90                  95
Gln Ser Lys Asn Thr Ser Leu Leu Ser Gly Ala Tyr Ala Ile Ser Asp
            100                 105                 110
Leu Ile Ala Glu Lys Leu Asn Val Leu Lys Asn Glu Glu Leu Lys Glu
        115                 120                 125
Lys Ile Asp Thr Ala Lys Gln Cys Ser Thr Glu Phe Thr Asn Lys Leu
    130                 135                 140
Lys Ser Glu His Ala Val Leu Gly Leu Asp Asn Leu Thr Asp Asp Asn
145                 150                 155                 160
```

Sub A1

```
Ala Gln Arg Ala Ile Leu Lys Lys His Ala Asn Lys Asp Lys Gly Ala
                165                 170                 175
Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ser Lys Ala
            180                 185                 190
Ala Gln Asp Thr Leu Lys Asn Ala Val Lys Glu Leu Thr Ser Pro Ile
        195                 200                 205
Val His Gly Asn Asn Ser Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser
    210                 215                 220
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
225                 230                 235                 240
Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Ile Glu Thr
                245                 250                 255
Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys
            260                 265                 270
Ile Gln Gln Asn Gly Gly Leu Ala Val Glu Ala Gly His Asn Gly Thr
        275                 280                 285
Leu Leu Ala Gly Ala Tyr Thr Ile Ser Lys Leu Ile Thr Gln Lys Leu
    290                 295                 300
Asp Gly Leu Lys Asn Ser Glu Lys Leu Lys Glu Lys Ile Glu Asn Ala
305                 310                 315                 320
Lys Lys Cys Ser Glu Asp Phe Thr Lys Lys Leu Glu Gly Glu His Ala
                325                 330                 335
Gln Leu Gly Ile Glu Asn Val Thr Asp Glu Asn Ala Lys Lys Ala Ile
            340                 345                 350
Leu Ile Thr Asp Ala Ala Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys
        355                 360                 365
Leu Phe Lys Ala Val Glu Asn Leu Ala Lys Ala Ala Lys Glu Met Leu
    370                 375                 380
Ala Asn Ser Val Lys Glu Leu
385                 390
```

<210> 75
<211> 1178
<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1178)

<400> 75

```
atg aga tta tta ata gga ttt gct tta gcg tta gct tta ata gga tgt    48
Met Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys
 1               5                  10                  15

gca caa aaa ggt gct gag tca att gga tcc tgt aat aat tca gga aaa    96
Ala Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys
            20                  25                  30

gat ggg aat gca tct gca aat tct gct gat gag tct gtt aaa ggg cct   144
Asp Gly Asn Ala Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro
        35                  40                  45

aat ctt aca gaa ata agt aaa aaa att aca gaa tct aac gca gtt gtt   192
Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val
    50                  55                  60
```

```
ctg gcc gtg aaa gaa gtt gag acc tta ctt gca tct ata gat gaa ctt   240
Leu Ala Val Lys Glu Val Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu
 65                  70                  75                  80

gct acc aaa gct att ggt aaa aaa ata ggc aat aat ggt tta gag gcc   288
Ala Thr Lys Ala Ile Gly Lys Lys Ile Gly Asn Asn Gly Leu Glu Ala
                85                  90                  95

aat cag agt aaa aac aca tca ttg tta tca gga gct tat gca ata tct   336
Asn Gln Ser Lys Asn Thr Ser Leu Leu Ser Gly Ala Tyr Ala Ile Ser
            100                 105                 110

gac cta ata gca gaa aaa tta aat gta ttg aaa aat gaa gaa tta aag   384
Asp Leu Ile Ala Glu Lys Leu Asn Val Leu Lys Asn Glu Glu Leu Lys
        115                 120                 125

gaa aag att gat aca gct aag caa tgt tct aca gaa ttt act aat aaa   432
Glu Lys Ile Asp Thr Ala Lys Gln Cys Ser Thr Glu Phe Thr Asn Lys
    130                 135                 140

cta aaa agt gaa cat gca gtg ctt ggt ctg gac aat ctt act gat gat   480
Leu Lys Ser Glu His Ala Val Leu Gly Leu Asp Asn Leu Thr Asp Asp
145                 150                 155                 160

aat gca caa aga gct att tta aaa aaa cat gca aat aaa gat aag ggt   528
Asn Ala Gln Arg Ala Ile Leu Lys Lys His Ala Asn Lys Asp Lys Gly
                165                 170                 175

gct gca gaa ctt gaa aag tta ttt aaa gcg gta gaa aac tta tca aaa   576
Ala Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ser Lys
            180                 185                 190

gca gct caa gac aca tta aaa aat gct gtt aaa gag ctt aca agt cct   624
Ala Ala Gln Asp Thr Leu Lys Asn Ala Val Lys Glu Leu Thr Ser Pro
        195                 200                 205

att gtc cat ggt aat aat tca aga aaa gat ggg aat gca tct aca aat   672
Ile Val His Gly Asn Asn Ser Arg Lys Asp Gly Asn Ala Ser Thr Asn
    210                 215                 220

tct gcc gat gag tct gtt aaa ggg cct aat ctt aca gaa ata agt aaa   720
Ser Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys
225                 230                 235                 240

aaa att aca gaa tct aac gca gtt gtt ctg gcc gtg aaa gaa gtt gag   768
Lys Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val Glu
                245                 250                 255

acc tta ctt gca tct ata gat gaa ctt gct acc aaa gct att ggt aag   816
Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly Lys
            260                 265                 270

aaa ata ggc aat aat ggt tta gag gcc aat cag agt aaa aac aca tca   864
Lys Ile Gly Asn Asn Gly Leu Glu Ala Asn Gln Ser Lys Asn Thr Ser
        275                 280                 285

ttg tta tca gga gct tat gca ata tct gac cta ata gca gaa aaa tta   912
Leu Leu Ser Gly Ala Tyr Ala Ile Ser Asp Leu Ile Ala Glu Lys Leu
    290                 295                 300
```

```
aat gta ttg aaa aat gaa gaa tta aag gaa aag att gat aca gct aag     960
Asn Val Leu Lys Asn Glu Glu Leu Lys Glu Lys Ile Asp Thr Ala Lys
305                 310                 315                 320

caa tgt tct aca gaa ttt act aat aaa cta aaa agt gaa cat gca gtg    1008
Gln Cys Ser Thr Glu Phe Thr Asn Lys Leu Lys Ser Glu His Ala Val
                325                 330                 335

ctt ggt ctg gac aat ctt act gat gat aat gca caa aga gct att tta    1056
Leu Gly Leu Asp Asn Leu Thr Asp Asp Asn Ala Gln Arg Ala Ile Leu
            340                 345                 350

aaa aaa cat gca aat aaa gat aag ggt gct gca gaa ctt gaa aag tta    1104
Lys Lys His Ala Asn Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu
        355                 360                 365

ttt aaa gcg gta gaa aac tta tca aaa gca gct caa gac aca tta aaa    1152
Phe Lys Ala Val Glu Asn Leu Ser Lys Ala Ala Gln Asp Thr Leu Lys
    370                 375                 380

aat gct gtt aaa gag ctt aca agt cc                                 1178
Asn Ala Val Lys Glu Leu Thr Ser
385                 390


<210> 76
<211> 391
<212> PRT
<213> ospC Chimera

<400> 76
Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys Ala
 1               5                  10                  15
Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys Asp
            20                  25                  30
Gly Asn Ala Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn
        35                  40                  45
Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val Val Leu
    50                  55                  60
Ala Val Lys Glu Val Glu Thr Leu Leu Ala Ser Ile Asp Glu Leu Ala
65                  70                  75                  80
Thr Lys Ala Ile Gly Lys Lys Ile Gly Asn Asn Gly Leu Glu Ala Asn
                85                  90                  95
Gln Ser Lys Asn Thr Ser Leu Leu Ser Gly Ala Tyr Ala Ile Ser Asp
            100                 105                 110
Leu Ile Ala Glu Lys Leu Asn Val Leu Lys Asn Glu Glu Leu Lys Glu
        115                 120                 125
Lys Ile Asp Thr Ala Lys Gln Cys Ser Thr Glu Phe Thr Asn Lys Leu
    130                 135                 140
Lys Ser Glu His Ala Val Leu Gly Leu Asp Asn Leu Thr Asp Asp Asn
145                 150                 155                 160
Ala Gln Arg Ala Ile Leu Lys Lys His Ala Asn Lys Asp Lys Gly Ala
                165                 170                 175
Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn Leu Ser Lys Ala
            180                 185                 190
Ala Gln Asp Thr Leu Lys Asn Ala Val Lys Glu Leu Thr Ser Pro Ile
        195                 200                 205
```

Sub A1

```
Val His Gly Asn Asn Ser Arg Lys Asp Gly Asn Ala Ser Thr Asn Ser
    210                 215                 220
Ala Asp Glu Ser Val Lys Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys
225                 230                 235                 240
Ile Thr Glu Ser Asn Ala Val Val Leu Ala Val Lys Glu Val Glu Thr
                245                 250                 255
Leu Leu Ala Ser Ile Asp Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys
            260                 265                 270
Ile Gly Asn Asn Gly Leu Glu Ala Asn Gln Ser Lys Asn Thr Ser Leu
        275                 280                 285
Leu Ser Gly Ala Tyr Ala Ile Ser Asp Leu Ile Ala Glu Lys Leu Asn
    290                 295                 300
Val Leu Lys Asn Glu Glu Leu Lys Glu Lys Ile Asp Thr Ala Lys Gln
305                 310                 315                 320
Cys Ser Thr Glu Phe Thr Asn Lys Leu Lys Ser Glu His Ala Val Leu
                325                 330                 335
Gly Leu Asp Asn Leu Thr Asp Asp Asn Ala Gln Arg Ala Ile Leu Lys
            340                 345                 350
Lys His Ala Asn Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe
        355                 360                 365
Lys Ala Val Glu Asn Leu Ser Lys Ala Ala Gln Asp Thr Leu Lys Asn
    370                 375                 380
Ala Val Lys Glu Leu Thr Ser
385                 390
```

<210> 77
<211> 1230
<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1230)

<400> 77

```
atg aga tta tta ata gga ttt gct tta gcg tta gct tta ata gga tgt   48
Met Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys
 1               5                  10                  15

gca caa aaa ggt gct gag tca att gga tcc tgt aat aat tca ggg aaa   96
Ala Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys
            20                  25                  30

gat ggg aat aca tct gca aat tct gct gat gag tct gtt aaa ggg cct   144
Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro
        35                  40                  45

aat ctt aca gaa ata agt aaa aaa att acg gat tct aat gcg gtt tta   192
Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu
    50                  55                  60

ctt gct gtg aaa gag gtt gaa gcg ttg ctg tca tct ata gat gaa att   240
Leu Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Ile
65                  70                  75                  80

gct gct aaa gct att ggt aaa aaa ata cac caa aat aat ggt ttg gat   288
Ala Ala Lys Ala Ile Gly Lys Lys Ile His Gln Asn Asn Gly Leu Asp
                85                  90                  95
```

```
acc gaa tat aat cac aat gga tca ttg tta gcg gga gct tat gca ata   336
Thr Glu Tyr Asn His Asn Gly Ser Leu Leu Ala Gly Ala Tyr Ala Ile
            100                 105                 110

tca acc cta ata aaa caa aaa tta gat gga ttg aaa aat gaa gga tta   384
Ser Thr Leu Ile Lys Gln Lys Leu Asp Gly Leu Lys Asn Glu Gly Leu
        115                 120                 125

aag gaa aaa att gat gcg gct aag aaa tgt tct gaa aca ttt act aat   432
Lys Glu Lys Ile Asp Ala Ala Lys Lys Cys Ser Glu Thr Phe Thr Asn
    130                 135                 140

aaa tta aaa gaa aaa cac aca gat ctt ggt aaa gaa ggt gtt act gat   480
Lys Leu Lys Glu Lys His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp
145                 150                 155                 160

gct gat gca aaa gaa gcc att tta aaa aca aat ggt act aaa act aaa   528
Ala Asp Ala Lys Glu Ala Ile Leu Lys Thr Asn Gly Thr Lys Thr Lys
                165                 170                 175

ggt gct gaa gaa ctt gga aaa tta ttt gaa tca gta gag gtc ttg tca   576
Gly Ala Glu Glu Leu Gly Lys Leu Phe Glu Ser Val Glu Val Leu Ser
            180                 185                 190

aaa gca gct aaa gag atg ctt gct aat tca gtt aaa gag ctt aca agc   624
Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser
        195                 200                 205

cct gtt gtg gca gaa agt cca aaa aaa cct ttc cat ggt aat aat tca   672
Pro Val Val Ala Glu Ser Pro Lys Lys Pro Phe His Gly Asn Asn Ser
    210                 215                 220

ggt ggg gat tct gca tct act aat cct gat gag tct gca aaa gga cct   720
Gly Gly Asp Ser Ala Ser Thr Asn Pro Asp Glu Ser Ala Lys Gly Pro
225                 230                 235                 240

aat ctt acc gta ata agc aaa aaa att aca gat tct aat gca ttt tta   768
Asn Leu Thr Val Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Phe Leu
                245                 250                 255

ctg gct gtg aaa gaa gtt gag gct ttg ctt tca tct ata gat gaa ctt   816
Leu Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Leu
            260                 265                 270

tct aaa gct att ggt aaa aaa ata aaa aat gat ggt act tta gat aac   864
Ser Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Gly Thr Leu Asp Asn
        275                 280                 285

gaa gca aat cga aac gaa tca ttg ata gca gga gct tat gaa ata tca   912
Glu Ala Asn Arg Asn Glu Ser Leu Ile Ala Gly Ala Tyr Glu Ile Ser
    290                 295                 300

aaa cta ata aca caa aaa tta agt gta ttg aat tca gaa gaa tta aag   960
Lys Leu Ile Thr Gln Lys Leu Ser Val Leu Asn Ser Glu Glu Leu Lys
305                 310                 315                 320
```

Sub A1

```
aaa aaa att aaa gag gct aag gat tgt tcc caa aaa ttt act act aag   1008
Lys Lys Ile Lys Glu Ala Lys Asp Cys Ser Gln Lys Phe Thr Thr Lys
                325                 330                 335

cta aaa gat agt cat gca gag ctt ggt ata caa agc gtt cag gat gat   1056
Leu Lys Asp Ser His Ala Glu Leu Gly Ile Gln Ser Val Gln Asp Asp
            340                 345                 350

aat gca aaa aaa gct att tta aaa aca cat gga act aaa gac aag ggt   1104
Asn Ala Lys Lys Ala Ile Leu Lys Thr His Gly Thr Lys Asp Lys Gly
        355                 360                 365

gct aaa gaa ctt gaa gag tta ttt aaa tca cta gaa agc ttg tca aaa   1152
Ala Lys Glu Leu Glu Glu Leu Phe Lys Ser Leu Glu Ser Leu Ser Lys
    370                 375                 380

gca gcg caa gca gca tta act aat tca gtt aaa gag ctt aca aat cct   1200
Ala Ala Gln Ala Ala Leu Thr Asn Ser Val Lys Glu Leu Thr Asn Pro
385                 390                 395                 400

gtt gtg gca gaa agt cca aaa aaa cct taa                          1230
Val Val Ala Glu Ser Pro Lys Lys Pro  *
                405
```

<210> 78
<211> 408
<212> PRT
<213> ospC Chimera

<400> 78

```
Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys Ala
 1               5                  10                  15
Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys Asp
            20                  25                  30
Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn
        35                  40                  45
Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu Leu
    50                  55                  60
Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Ile Ala
65                  70                  75                  80
Ala Lys Ala Ile Gly Lys Lys Ile His Gln Asn Asn Gly Leu Asp Thr
                85                  90                  95
Glu Tyr Asn His Asn Gly Ser Leu Leu Ala Gly Ala Tyr Ala Ile Ser
            100                 105                 110
Thr Leu Ile Lys Gln Lys Leu Asp Gly Leu Lys Asn Glu Gly Leu Lys
        115                 120                 125
Glu Lys Ile Asp Ala Ala Lys Lys Cys Ser Glu Thr Phe Thr Asn Lys
    130                 135                 140
Leu Lys Glu Lys His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp Ala
145                 150                 155                 160
Asp Ala Lys Glu Ala Ile Leu Lys Thr Asn Gly Thr Lys Thr Lys Gly
                165                 170                 175
Ala Glu Glu Leu Gly Lys Leu Phe Glu Ser Val Glu Val Leu Ser Lys
            180                 185                 190
Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser Pro
        195                 200                 205
Val Val Ala Glu Ser Pro Lys Lys Pro Phe His Gly Asn Asn Ser Gly
    210                 215                 220
```

Sub A1

```
Gly Asp Ser Ala Ser Thr Asn Pro Asp Glu Ser Ala Lys Gly Pro Asn
225                 230                 235                 240
Leu Thr Val Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Phe Leu Leu
                245                 250                 255
Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Leu Ser
            260                 265                 270
Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Gly Thr Leu Asp Asn Glu
        275                 280                 285
Ala Asn Arg Asn Glu Ser Leu Ile Ala Gly Ala Tyr Glu Ile Ser Lys
    290                 295                 300
Leu Ile Thr Gln Lys Leu Ser Val Leu Asn Ser Glu Glu Leu Lys Lys
305                 310                 315                 320
Lys Ile Lys Glu Ala Lys Asp Cys Ser Gln Lys Phe Thr Thr Lys Leu
                325                 330                 335
Lys Asp Ser His Ala Glu Leu Gly Ile Gln Ser Val Gln Asp Asp Asn
            340                 345                 350
Ala Lys Lys Ala Ile Leu Lys Thr His Gly Thr Lys Asp Lys Gly Ala
        355                 360                 365
Lys Glu Leu Glu Glu Leu Phe Lys Ser Leu Glu Ser Leu Ser Lys Ala
    370                 375                 380
Ala Gln Ala Ala Leu Thr Asn Ser Val Lys Glu Leu Thr Asn Pro Val
385                 390                 395                 400
Val Ala Glu Ser Pro Lys Lys Pro
                405
```

<210> 79
<211> 1209
<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1209)

<400> 79

```
atg aga tta tta ata gga ttt gct tta gcg tta gct tta ata gga tgt   48
Met Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys
 1               5                  10                  15

gca caa aaa ggt gct gag tca att gga tcc tgt aat aat tca ggg aaa   96
Ala Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys
            20                  25                  30

gat ggg aat aca tct gca aat tct gct gat gag tct gtt aaa ggg cct  144
Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro
        35                  40                  45

aat ctt aca gaa ata agt aaa aaa att acg gat tct aat gcg gtt tta  192
Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu
    50                  55                  60

ctt gct gtg aaa gag gtt gaa gcg ttg ctg tca tct ata gat gaa att  240
Leu Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Ile
65                  70                  75                  80

gct gct aaa gct att ggt aaa aaa ata cac caa aat aat ggt ttg gat  288
Ala Ala Lys Ala Ile Gly Lys Lys Ile His Gln Asn Asn Gly Leu Asp
                85                  90                  95
```

Sub A1

```
acc gaa tat aat cac aat gga tca ttg tta gcg gga gct tat gca ata   336
Thr Glu Tyr Asn His Asn Gly Ser Leu Leu Ala Gly Ala Tyr Ala Ile
            100                 105                 110

tca acc cta ata aaa caa aaa tta gat gga ttg aaa aat gaa gga tta   384
Ser Thr Leu Ile Lys Gln Lys Leu Asp Gly Leu Lys Asn Glu Gly Leu
        115                 120                 125

aag gaa aaa att gat gcg gct aag aaa tgt tct gaa aca ttt act aat   432
Lys Glu Lys Ile Asp Ala Ala Lys Lys Cys Ser Glu Thr Phe Thr Asn
    130                 135                 140

aaa tta aaa gaa aaa cac aca gat ctt ggt aaa gaa ggt gtt act gat   480
Lys Leu Lys Glu Lys His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp
145                 150                 155                 160

gct gat gca aaa gaa gcc att tta aaa aca aat ggt act aaa act aaa   528
Ala Asp Ala Lys Glu Ala Ile Leu Lys Thr Asn Gly Thr Lys Thr Lys
                165                 170                 175

ggt gct gaa gaa ctt gga aaa tta ttt gaa tca gta gag gtc ttg tca   576
Gly Ala Glu Glu Leu Gly Lys Leu Phe Glu Ser Val Glu Val Leu Ser
            180                 185                 190

aaa gca gct aaa gag atg ctt gct aat tca gtt aaa gag ctt aca agc   624
Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser
        195                 200                 205

cct gtt gtg gca gaa agt cca aaa aaa cct tcc atg gta aat aat tca   672
Pro Val Val Ala Glu Ser Pro Lys Lys Pro Ser Met Val Asn Asn Ser
    210                 215                 220

ggg aaa gat ggg aat aca tct gca aat tct gct gat gag tct gtt aaa   720
Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys
225                 230                 235                 240

ggg cct aat ctt aca gaa ata agt aaa aaa att aca gaa tct aac gca   768
Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala
                245                 250                 255

gtt gtt ctc gcc gtg aaa gaa gtt gaa act ttg ctt aca tct ata gat   816
Val Val Leu Ala Val Lys Glu Val Glu Thr Leu Leu Thr Ser Ile Asp
            260                 265                 270

gag ctt gct aaa gct att ggt aaa aaa ata aaa aac gat gtt agt tta   864
Glu Leu Ala Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Val Ser Leu
        275                 280                 285

gat aat gag gca gat cac aac gga tca tta ata tca gga gca tat tta   912
Asp Asn Glu Ala Asp His Asn Gly Ser Leu Ile Ser Gly Ala Tyr Leu
    290                 295                 300

att tca aac tta ata aca aaa aaa ata agt gca ata aaa gat tca gga   960
Ile Ser Asn Leu Ile Thr Lys Lys Ile Ser Ala Ile Lys Asp Ser Gly
305                 310                 315                 320

gaa ttg aag gca gaa att gaa aag gct aag aaa tgt tct gaa gaa ttt  1008
```

Sub A1

```
Glu Leu Lys Ala Glu Ile Glu Lys Ala Lys Lys Cys Ser Glu Glu Phe
                325                 330                 335

act gct aaa tta aaa ggt gaa cac aca gat ctt ggt aaa gaa ggc gtt   1056
Thr Ala Lys Leu Lys Gly Glu His Thr Asp Leu Gly Lys Glu Gly Val
            340                 345                 350

act gat gat aat gca aaa aaa gcc att tta aaa aca aat aat gat aaa   1104
Thr Asp Asp Asn Ala Lys Lys Ala Ile Leu Lys Thr Asn Asn Asp Lys
        355                 360                 365

act aag ggc gct gat gaa ctt gaa aag tta ttt gaa tca gta aaa aac   1152
Thr Lys Gly Ala Asp Glu Leu Glu Lys Leu Phe Glu Ser Val Lys Asn
    370                 375                 380

ttg tca aaa gca gct aaa gag atg ctt act aat tca gtt aaa gag ctt   1200
Leu Ser Lys Ala Ala Lys Glu Met Leu Thr Asn Ser Val Lys Glu Leu
385                 390                 395                 400

aca agc taa                                                      1209
Thr Ser  *
```

<210> 80
<211> 401
<212> PRT
<213> ospC Chimera

<400> 80

```
Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys Ala
 1               5                  10                  15
Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys Asp
            20                  25                  30
Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn
        35                  40                  45
Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu Leu
    50                  55                  60
Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Ile Ala
65                  70                  75                  80
Ala Lys Ala Ile Gly Lys Lys Ile His Gln Asn Asn Gly Leu Asp Thr
                85                  90                  95
Glu Tyr Asn His Asn Gly Ser Leu Leu Ala Gly Ala Tyr Ala Ile Ser
            100                 105                 110
Thr Leu Ile Lys Gln Lys Leu Asp Gly Leu Lys Asn Glu Gly Leu Lys
        115                 120                 125
Glu Lys Ile Asp Ala Ala Lys Lys Cys Ser Glu Thr Phe Thr Asn Lys
    130                 135                 140
Leu Lys Glu Lys His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp Ala
145                 150                 155                 160
Asp Ala Lys Glu Ala Ile Leu Lys Thr Asn Gly Thr Lys Thr Lys Gly
                165                 170                 175
Ala Glu Glu Leu Gly Lys Leu Phe Glu Ser Val Glu Val Leu Ser Lys
            180                 185                 190
Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser Pro
        195                 200                 205
Val Val Ala Glu Ser Pro Lys Lys Pro Ser Met Val Asn Asn Ser Gly
    210                 215                 220
```

Sub A1

```
Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly
225                 230                 235                 240
Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val
                245                 250                 255
Val Leu Ala Val Lys Glu Val Glu Thr Leu Leu Thr Ser Ile Asp Glu
            260                 265                 270
Leu Ala Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Val Ser Leu Asp
        275                 280                 285
Asn Glu Ala Asp His Asn Gly Ser Leu Ile Ser Gly Ala Tyr Leu Ile
    290                 295                 300
Ser Asn Leu Ile Thr Lys Lys Ile Ser Ala Ile Lys Asp Ser Gly Glu
305                 310                 315                 320
Leu Lys Ala Glu Ile Glu Lys Ala Lys Lys Cys Ser Glu Glu Phe Thr
                325                 330                 335
Ala Lys Leu Lys Gly Glu His Thr Asp Leu Gly Lys Glu Gly Val Thr
            340                 345                 350
Asp Asp Asn Ala Lys Lys Ala Ile Leu Lys Thr Asn Asn Asp Lys Thr
        355                 360                 365
Lys Gly Ala Asp Glu Leu Glu Lys Leu Phe Glu Ser Val Lys Asn Leu
    370                 375                 380
Ser Lys Ala Ala Lys Glu Met Leu Thr Asn Ser Val Lys Glu Leu Thr
385                 390                 395                 400
Ser
```

<210> 81
<211> 1205
<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1205)

<400> 81

```
atg aga tta tta ata gga ttt gct tta gcg tta gct tta ata gga tgt   48
Met Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys
 1               5                  10                  15

gca caa aaa ggt gct gag tca att gga tcc tgt aat aat tca ggg aaa   96
Ala Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys
            20                  25                  30

gat ggg aat aca tct gca aat tct gct gat gag tct gtt aaa ggg cct   144
Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro
        35                  40                  45

aat ctt aca gaa ata agt aaa aaa att acg gat tct aat gcg gtt tta   192
Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu
    50                  55                  60

ctt gct gtg aaa gag gtt gaa gcg ttg ctg tca tct ata gat gaa att   240
Leu Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Ile
65                  70                  75                  80

gct gct aaa gct att ggt aaa aaa ata cac caa aat aat ggt ttg gat   288
Ala Ala Lys Ala Ile Gly Lys Lys Ile His Gln Asn Asn Gly Leu Asp
                85                  90                  95
```

SubA1

```
acc gaa tat aat cac aat gga tca ttg tta gcg gga gct tat gca ata   336
Thr Glu Tyr Asn His Asn Gly Ser Leu Leu Ala Gly Ala Tyr Ala Ile
            100                 105                 110

tca acc cta ata aaa caa aaa tta gat gga ttg aaa aat gaa gga tta   384
Ser Thr Leu Ile Lys Gln Lys Leu Asp Gly Leu Lys Asn Glu Gly Leu
        115                 120                 125

aag gaa aaa att gat gcg gct aag aaa tgt tct gaa aca ttt act aat   432
Lys Glu Lys Ile Asp Ala Ala Lys Lys Cys Ser Glu Thr Phe Thr Asn
    130                 135                 140

aaa tta aaa gaa aaa cac aca gat ctt ggt aaa gaa ggt gtt act gat   480
Lys Leu Lys Glu Lys His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp
145                 150                 155                 160

gct gat gca aaa gaa gcc att tta aaa aca aat ggt act aaa act aaa   528
Ala Asp Ala Lys Glu Ala Ile Leu Lys Thr Asn Gly Thr Lys Thr Lys
                165                 170                 175

ggt gct gaa gaa ctt gga aaa tta ttt gaa tca gta gag gtc ttg tca   576
Gly Ala Glu Glu Leu Gly Lys Leu Phe Glu Ser Val Glu Val Leu Ser
            180                 185                 190

aaa gca gct aaa gag atg ctt gct aat tca gtt aaa gag ctt aca agc   624
Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser
        195                 200                 205

cct gtt gtg gca gaa agt cca aaa aaa cct tcc atg gta aat aat tca   672
Pro Val Val Ala Glu Ser Pro Lys Lys Pro Ser Met Val Asn Asn Ser
    210                 215                 220

gga aaa gat ggg aat aca tct gca aat tct gct gat gag tct gtt aaa   720
Gly Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys
225                 230                 235                 240

ggg cct aat ctt aca gaa ata agt aaa aaa att aca gaa tct aac gca   768
Gly Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala
                245                 250                 255

gtt gtt ctg gct gtg aaa gaa att gaa act ttg ctt gca tct ata gat   816
Val Val Leu Ala Val Lys Glu Ile Glu Thr Leu Leu Ala Ser Ile Asp
            260                 265                 270

gaa ctt gct act aaa gct att ggt aaa aaa ata caa caa aat ggt ggt   864
Glu Leu Ala Thr Lys Ala Ile Gly Lys Lys Ile Gln Gln Asn Gly Gly
        275                 280                 285

tta gct gtc gaa gcg ggg cat aat gga aca ttg tta gca ggt gct tat   912
Leu Ala Val Glu Ala Gly His Asn Gly Thr Leu Leu Ala Gly Ala Tyr
    290                 295                 300

aca ata tca aaa cta ata aca caa aaa tta gat gga ttg aaa aat tca   960
Thr Ile Ser Lys Leu Ile Thr Gln Lys Leu Asp Gly Leu Lys Asn Ser
305                 310                 315                 320
```

```
gaa aaa tta aag gaa aaa att gaa aat gct aag aaa tgt tct gaa gat   1008
Glu Lys Leu Lys Glu Lys Ile Glu Asn Ala Lys Lys Cys Ser Glu Asp
                325                 330                 335

ttt act aaa aaa cta gaa gga gaa cat gcg caa ctt gga att gaa aat   1056
Phe Thr Lys Lys Leu Glu Gly Glu His Ala Gln Leu Gly Ile Glu Asn
            340                 345                 350

gtt act gat gag aat gca aaa aaa gct att tta ata aca gat gca gct   1104
Val Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu Ile Thr Asp Ala Ala
        355                 360                 365

aaa gat aag ggc gct gca gag ctt gaa aag cta ttt aaa gca gta gaa   1152
Lys Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu
    370                 375                 380

aac ttg gca aaa gca gct aaa gag atg ctt gct aat tca gtt aaa gag   1200
Asn Leu Ala Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu
385                 390                 395                 400

ctt ac                                                           1205
Leu
```

<210> 82
<211> 400
<212> PRT
<213> ospC Chimera

<400> 82

```
Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys Ala
 1               5                  10                  15
Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Asn Asn Ser Gly Lys Asp
            20                  25                  30
Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly Pro Asn
        35                  40                  45
Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Val Leu Leu
    50                  55                  60
Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp Glu Ile Ala
65                  70                  75                  80
Ala Lys Ala Ile Gly Lys Lys Ile His Gln Asn Asn Gly Leu Asp Thr
                85                  90                  95
Glu Tyr Asn His Asn Gly Ser Leu Leu Ala Gly Ala Tyr Ala Ile Ser
            100                 105                 110
Thr Leu Ile Lys Gln Lys Leu Asp Gly Leu Lys Asn Glu Gly Leu Lys
        115                 120                 125
Glu Lys Ile Asp Ala Ala Lys Lys Cys Ser Glu Thr Phe Thr Asn Lys
    130                 135                 140
Leu Lys Glu Lys His Thr Asp Leu Gly Lys Glu Gly Val Thr Asp Ala
145                 150                 155                 160
Asp Ala Lys Glu Ala Ile Leu Lys Thr Asn Gly Thr Lys Thr Lys Gly
                165                 170                 175
Ala Glu Glu Leu Gly Lys Leu Phe Glu Ser Val Glu Val Leu Ser Lys
            180                 185                 190
Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu Thr Ser Pro
        195                 200                 205
Val Val Ala Glu Ser Pro Lys Lys Pro Ser Met Val Asn Asn Ser Gly
    210                 215                 220
```

```
Lys Asp Gly Asn Thr Ser Ala Asn Ser Ala Asp Glu Ser Val Lys Gly
225                 230                 235                 240
Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Glu Ser Asn Ala Val
                245                 250                 255
Val Leu Ala Val Lys Glu Ile Glu Thr Leu Leu Ala Ser Ile Asp Glu
            260                 265                 270
Leu Ala Thr Lys Ala Ile Gly Lys Lys Ile Gln Gln Asn Gly Gly Leu
        275                 280                 285
Ala Val Glu Ala Gly His Asn Gly Thr Leu Leu Ala Gly Ala Tyr Thr
    290                 295                 300
Ile Ser Lys Leu Ile Thr Gln Lys Leu Asp Gly Leu Lys Asn Ser Glu
305                 310                 315                 320
Lys Leu Lys Glu Lys Ile Glu Asn Ala Lys Lys Cys Ser Glu Asp Phe
                325                 330                 335
Thr Lys Lys Leu Glu Gly Glu His Ala Gln Leu Gly Ile Glu Asn Val
            340                 345                 350
Thr Asp Glu Asn Ala Lys Lys Ala Ile Leu Ile Thr Asp Ala Ala Lys
        355                 360                 365
Asp Lys Gly Ala Ala Glu Leu Glu Lys Leu Phe Lys Ala Val Glu Asn
    370                 375                 380
Leu Ala Lys Ala Ala Lys Glu Met Leu Ala Asn Ser Val Lys Glu Leu
385                 390                 395                 400
```

<210> 83
<211> 1236
<212> DNA
<213> ospC Chimera

<220>
<221> CDS
<222> (1)...(1236)

<400> 83

```
atg aga tta tta ata gga ttt gct tta gcg tta gct tta ata gga tgt   48
Met Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys
 1               5                  10                  15

gca caa aaa ggt gct gag tca att gga tcc tgt agt aat tca ggg aaa   96
Ala Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Ser Asn Ser Gly Lys
            20                  25                  30

ggt ggg gat tct gca tct act aat cct gct gac gag tct gcg aaa ggg   144
Gly Gly Asp Ser Ala Ser Thr Asn Pro Ala Asp Glu Ser Ala Lys Gly
        35                  40                  45

cct aat ctt aca gaa ata agc aaa aaa att aca gat tct aat gca ttt   192
Pro Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Phe
    50                  55                  60

gta ctt gct gtt aaa gaa gtt gag act ttg gtt tta tct ata gat gaa   240
Val Leu Ala Val Lys Glu Val Glu Thr Leu Val Leu Ser Ile Asp Glu
65                  70                  75                  80

ctt gct aag aaa gct att ggt caa aaa ata gac aat aat aat ggt tta   288
Leu Ala Lys Lys Ala Ile Gly Gln Lys Ile Asp Asn Asn Asn Gly Leu
                85                  90                  95
```

Sub A1

gct gct tta aat aat cag aat gga tcg ttg tta gca gga gcc tat gca 336
Ala Ala Leu Asn Asn Gln Asn Gly Ser Leu Leu Ala Gly Ala Tyr Ala
100 105 110

ata tca acc cta ata aca gaa aaa ttg agt aaa ttg aaa aat tta gaa 384
Ile Ser Thr Leu Ile Thr Glu Lys Leu Ser Lys Leu Lys Asn Leu Glu
115 120 125

gaa tta aag aca gaa att gca aag gct aag aaa tgt tcc gaa gaa ttt 432
Glu Leu Lys Thr Glu Ile Ala Lys Ala Lys Lys Cys Ser Glu Glu Phe
130 135 140

act aat aaa cta aaa agt ggt cat gca gat ctt ggc aaa cag gat gct 480
Thr Asn Lys Leu Lys Ser Gly His Ala Asp Leu Gly Lys Gln Asp Ala
145 150 155 160

acc gat gat cat gca aaa gca gct att tta aaa aca cat gca act acc 528
Thr Asp Asp His Ala Lys Ala Ala Ile Leu Lys Thr His Ala Thr Thr
165 170 175

gat aaa ggt gct aaa gaa ttt aaa gat tta ttt gaa tca gta gaa ggt 576
Asp Lys Gly Ala Lys Glu Phe Lys Asp Leu Phe Glu Ser Val Glu Gly
180 185 190

ttg tta aaa gca gct caa gta gca cta act aat tca gtt aaa gaa ctt 624
Leu Leu Lys Ala Ala Gln Val Ala Leu Thr Asn Ser Val Lys Glu Leu
195 200 205

aca agt cct gtt gta gca gaa agt cca aaa aaa cct cat atg gct aat 672
Thr Ser Pro Val Val Ala Glu Ser Pro Lys Lys Pro His Met Ala Asn
210 215 220

aat tca ggt ggg gat tct gca tct act aat cct gat gag tct gca aaa 720
Asn Ser Gly Gly Asp Ser Ala Ser Thr Asn Pro Asp Glu Ser Ala Lys
225 230 235 240

gga cct aat ctt acc gta ata agc aaa aaa att aca gat tct aat gca 768
Gly Pro Asn Leu Thr Val Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala
245 250 255

ttt tta ctg gct gtg aaa gaa gtt gag gct ttg ctt tca tct ata gat 816
Phe Leu Leu Ala Val Lys Glu Val Glu Ala Leu Leu Ser Ser Ile Asp
260 265 270

gaa ctt tct aaa gct att ggt aaa aaa ata aaa aat gat ggt act tta 864
Glu Leu Ser Lys Ala Ile Gly Lys Lys Ile Lys Asn Asp Gly Thr Leu
275 280 285

gat aac gaa gca aat cga aac gaa tca ttg ata gca gga gct tat gaa 912
Asp Asn Glu Ala Asn Arg Asn Glu Ser Leu Ile Ala Gly Ala Tyr Glu
290 295 300

ata tca aaa cta ata aca caa aaa tta agt gta ttg aat tca gaa gaa 960
Ile Ser Lys Leu Ile Thr Gln Lys Leu Ser Val Leu Asn Ser Glu Glu
305 310 315 320

tta aag aaa aaa att aaa gag gct aag gat tgt tcc caa aaa ttt act 1008
Leu Lys Lys Lys Ile Lys Glu Ala Lys Asp Cys Ser Gln Lys Phe Thr
325 330 335

```
act aag cta aaa gat agt cat gca gag ctt ggt ata caa agc gtt cag   1056
Thr Lys Leu Lys Asp Ser His Ala Glu Leu Gly Ile Gln Ser Val Gln
            340                 345                 350

gat gat aat gca aaa aaa gct att tta aaa aca cat gga act aaa gac   1104
Asp Asp Asn Ala Lys Lys Ala Ile Leu Lys Thr His Gly Thr Lys Asp
        355                 360                 365

aag ggt gct aaa gaa ctt gaa gag tta ttt aaa tca cta gaa agc ttg   1152
Lys Gly Ala Lys Glu Leu Glu Glu Leu Phe Lys Ser Leu Glu Ser Leu
    370                 375                 380

tca aaa gca gcg caa gca gca tta act aat tca gtt aaa gag ctt aca   1200
Ser Lys Ala Ala Gln Ala Ala Leu Thr Asn Ser Val Lys Glu Leu Thr
385                 390                 395                 400

aat cct gtt gtg gca gaa agt cca aaa aaa cct taa                  1236
Asn Pro Val Val Ala Glu Ser Pro Lys Lys Pro  *
                405                 410
```

<210> 84
<211> 410
<212> PRT
<213> ospC Chimera

<400> 84

```
Arg Leu Leu Ile Gly Phe Ala Leu Ala Leu Ala Leu Ile Gly Cys Ala
 1               5                  10                  15
Gln Lys Gly Ala Glu Ser Ile Gly Ser Cys Ser Asn Ser Gly Lys Gly
            20                  25                  30
Gly Asp Ser Ala Ser Thr Asn Pro Ala Asp Glu Ser Ala Lys Gly Pro
        35                  40                  45
Asn Leu Thr Glu Ile Ser Lys Lys Ile Thr Asp Ser Asn Ala Phe Val
    50                  55                  60
Leu Ala Val Lys Glu Val Glu Thr Leu Val Leu Ser Ile Asp Glu Leu
65                  70                  75                  80
Ala Lys Lys Ala Ile Gly Gln Lys Ile Asp Asn Asn Asn Gly Leu Ala
                85                  90                  95
Ala Leu Asn Asn Gln Asn Gly Ser Leu Leu Ala Gly Ala Tyr Ala Ile
            100                 105                 110
Ser Thr Leu Ile Thr Glu Lys Leu Ser Lys Leu Lys Asn Leu Glu Glu
        115                 120                 125
Leu Lys Thr Glu Ile Ala Lys Ala Lys Lys Cys Ser Glu Glu Phe Thr
    130                 135                 140
Asn Lys Leu Lys Ser Gly His Ala Asp Leu Gly Lys Gln Asp Ala Thr
145                 150                 155                 160
Asp Asp His Ala Lys Ala Ala Ile Leu Lys Thr His Ala Thr Thr Asp
                165                 170                 175
Lys Gly Ala Lys Glu Phe Lys Asp Leu Phe Glu Ser Val Glu Gly Leu
            180                 185                 190
Leu Lys Ala Ala Gln Val Ala Leu Thr Asn Ser Val Lys Glu Leu Thr
        195                 200                 205
Ser Pro Val Val Ala Glu Ser Pro Lys Lys Pro His Met Ala Asn Asn
    210                 215                 220
Ser Gly Gly Asp Ser Ala Ser Thr Asn Pro Asp Glu Ser Ala Lys Gly
225                 230                 235                 240
```

SubA1

Pro	Asn	Leu	Thr	Val	Ile	Ser	Lys	Lys	Ile	Thr	Asp	Ser	Asn	Ala	Phe
				245					250					255	
Leu	Leu	Ala	Val	Lys	Glu	Val	Glu	Ala	Leu	Leu	Ser	Ser	Ile	Asp	Glu
			260					265					270		
Leu	Ser	Lys	Ala	Ile	Gly	Lys	Lys	Ile	Lys	Asn	Asp	Gly	Thr	Leu	Asp
		275					280					285			
Asn	Glu	Ala	Asn	Arg	Asn	Glu	Ser	Leu	Ile	Ala	Gly	Ala	Tyr	Glu	Ile
	290					295					300				
Ser	Lys	Leu	Ile	Thr	Gln	Lys	Leu	Ser	Val	Leu	Asn	Ser	Glu	Glu	Leu
305					310					315					320
Lys	Lys	Lys	Ile	Lys	Glu	Ala	Lys	Asp	Cys	Ser	Gln	Lys	Phe	Thr	Thr
				325					330					335	
Lys	Leu	Lys	Asp	Ser	His	Ala	Glu	Leu	Gly	Ile	Gln	Ser	Val	Gln	Asp
			340					345					350		
Asp	Asn	Ala	Lys	Lys	Ala	Ile	Leu	Lys	Thr	His	Gly	Thr	Lys	Asp	Lys
		355					360					365			
Gly	Ala	Lys	Glu	Leu	Glu	Glu	Leu	Phe	Lys	Ser	Leu	Glu	Ser	Leu	Ser
	370					375					380				
Lys	Ala	Ala	Gln	Ala	Ala	Leu	Thr	Asn	Ser	Val	Lys	Glu	Leu	Thr	Asn
385					390					395					400
Pro	Val	Val	Ala	Glu	Ser	Pro	Lys	Lys	Pro						
				405					410						